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Westinghouse Hanford Company Environmental Surveillance Annual Report--200/600 Areas

Calendar Year 1988

R. E. Elder
S. M. McKinney
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WESTINGHOUSE HANFORD COMPANY ENVIRONMENTAL SURVEILLANCE ANNUAL REPORT--200/600 AREAS

Calendar Year 1988

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S. M. McKinney
W. L. Osborne

Westinghouse Hanford Company

ABSTRACT

This document presents the results of near-field environmental surveillance as performed by Westinghouse Hanford Company in 1988 of the Operations Area of the Hanford Site, Washington State. These activities are conducted in the 200 and 600 Areas to assess and control the impacts of operations on the worker and the local environment. Surveillance activities include sampling and analysis of ambient air, surface water, groundwater, sediments, soil, and biota. External radiation measurements and radiological surveys of waste disposal sites, radiological control areas, and roads are also performed.

Document Title: **Westinghouse Hanford Company Environmental Surveillance Annual Report--200/600 Areas Calendar Year 1988**

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G. D. Carpenter Concurring Approval	5/30/89 Date
D. A. Turner Program Office	5-26-89 Date

EXECUTIVE SUMMARY

Near-field environmental surveillance of the Operations Area of the Hanford Site is performed by Westinghouse Hanford Company (Westinghouse Hanford) to assess and control the impacts of operations on the worker and the local environment. The results and conclusions of this program are presented in two reports: one for the 100 Areas and this report, covering the 200 and 600 Areas.

Surveillance activities in the 200 and 600 Areas include sampling and analysis of ambient air, surface water, groundwater, sediments, soil, and biota. External radiation measurements and radiological surveys of waste disposal sites, radiological control areas, and roads are also performed. The 1988 data are summarized below.

REGULATORY CONTROLS

Radiation exposure to workers and the offsite population are regulated by a tiered system of controls. The U.S. Department of Energy (DOE) has established the occupational exposure limit at 5,000 mrem/yr. The exposure limits for any member of the public were set by the DOE at 500 mrem/yr for occasional annual exposures and at 100 mrem/yr for annual exposures expected to last longer than 5 yr. An administrative action level of 25 mrem/yr (to the maximum individual member of the public) has been identified by the DOE to ensure that these exposure limits are not exceeded.

Derived concentration guidelines (DCG) corresponding to the 100 mrem/yr effective dose equivalent standard are used for comparison purposes only in this report. It should be noted that the DCG are applicable at the point of actual exposure to members of the public (off the Hanford Site) and are, therefore, not applicable onsite. In keeping with Westinghouse Hanford's philosophy to keep exposures to workers, and thereby the public, as low as reasonably achievable (ALARA), Westinghouse Hanford establishes ALARA requirements called administrative control values (ACV), which are used as guidance in maintaining releases below applicable regulatory standards.

AMBIENT AIR MONITORING

The concentrations of airborne radionuclides measured in the 200 Areas were many times less than the DCG. Results of a trend analysis using data collected since 1979 demonstrated a continued decline overall in airborne ^{137}Cs, ^{90}Sr, and ^{239}Pu in the 200 Areas because of continuing improvement in operational environmental control. Only one individual site demonstrated an upward trend with any radionuclide concentration. With the exception of the very slight upward trend of ^{239}Pu at N165, all individual stations for all measured radionuclides have been showing a generally downward trend.

GROUNDWATER MONITORING

The groundwater beneath 11 waste sites exceeded the DCG on an annual average for 1988. Two sites were in use, eight were inactive, and one has never been used. None of the sites have projected offsite doses that exceed the DOE limits.

- The annual average for tritium in the groundwater beneath the active 216-A-45 and 216-A-37-1 Cribs was 1 and 2 times the DCG, respectively. This was down from an annual average of 3 times the DCG in 1987 for both cribs. Tritium in groundwater beneath the inactive 216-A-10 Crib had an annual average of 2 times the DCG. This was down from 2.5 times the DCG in 1987. Nearby wells at the 216-A-37-1 and 216-A-10 Cribs have shown increases, indicating plume movement.

- The annual average ^{90}Sr concentration beneath the inactive 216-B-5 Reverse Well was 6 times the DCG, virtually unchanged from 1987 levels.

- The annual average for ^{234}U and ^{238}U in the groundwater at the inactive 216-U-1 and -2 Cribs exceeded the DCG by factors of 3 and 2, respectively. This was down from 7 and 5.5 times the DCG, respectively, in 1987. Concentration changes in the surrounding wells indicate plume movement towards the east.

The groundwater beneath seven sites exceeded internal Westinghouse Hanford ACVs on an annual average, as opposed to nine sites in 1987. Except for ^{3}H, these ACVs are established at or below the DCG for the short half-life radionuclides, and equal to the maximum contaminant levels (DWS) for long life radionuclides. The following sites have shown an overall decrease from those concentrations reported in 1987:

- Uranium isotopes in the groundwater exceeded the ACV at the active 216-U-17 and 216-S-25 Cribs, the decommissioned 216-U-10 Pond, and the inactive 216-S-21, 216-U-1, and 216-U-2 Cribs.

- The ^{137}Cs and ^{239}Pu concentrations exceeded the ACV beneath the inactive 216-B-5 Reverse Well.

- The ^{99}Tc concentration was greater than the ACV in the groundwater beneath the active 216-U-17 Crib and the inactive 216-U-1 and -2 Cribs.

SOIL AND BIOTA MONITORING

In 1988, the concentrations of radionuclides in surface soil at the grid sites throughout the 200/600 Area environment were well below all Westinghouse Hanford soil standards (established to ensure compliance with DOE standards). The 200 East Area average soil concentration of ^{90}Sr, ^{137}Cs, and ^{239}Pu was only 0.10%, 0.02%, and 0.05% of the soil standards, respectively. The 200 West Area average soil concentration of ^{90}Sr, ^{137}Cs, and ^{239}Pu was only 0.09%, 0.02%, and 0.31% of the soil standards, respectively. Trend analysis revealed radionuclide concentrations in soil at the grid sites consistent (e.g., no overall increase) with those identified over the past 11 yr.

The only gamma-emitting radionuclide in vegetation samples collected from the grid sites that exceeded background levels (as established by Battelle's Pacific Northwest Laboratory (PNL) at the Hanford Site perimeter) was ^{137}Cs. The ^{137}Cs levels were slightly elevated above background at all of the 84 sites sampled. The average ^{137}Cs concentration in vegetation samples collected in the 200 East and 200 West Areas was 0.27 pCi/g and 0.35 pCi/g, respectively. The mean concentration of ^{137}Cs in vegetation at the site perimeter was 0.011 pCi/g.* The concentration of ^{137}Cs in vegetation has remained constant with historical data.

EXTERNAL RADIATION MONITORING

Exposure rates from penetrating radiations, primarily gamma rays, were measured in the general 200 Area environment and were found to be consistent with background levels. The environmental thermoluminescent dosimeters measured exposure rates from all external radiation sources: cosmic, naturally occurring radioactivity in air and soil, fallout from nuclear weapons testing, as well as any contribution from 200 Area activities. In 1988, operations in the 200 Area did not contribute significantly to the external exposure rate (as measured by PNL) in the general environment. Consequently, the exposure rate in the 200 Area environment was not significantly different from the exposure rate received offsite from natural sources of radiation. As expected, external radiation levels were elevated at certain grid sites, radiological control areas, and facilities, reflecting the proximity to radioactive waste management activities.

POND AND DITCH MONITORING

While there were some increases in radioactivity observed in the ponds and ditches in 1988, none of these levels exceeded the applicable standards. All surface waters associated with 200 Area operations were below the DCG for all measured radionuclides. The analytical results of vegetation samples taken at the ponds and ditches revealed that physiological uptake of radionuclides was relatively insignificant. Sediment samples taken demonstrated elevated levels of mainly ^{137}Cs. However, all ponds and ditches that receive potentially contaminated water are within posted radiological control areas.

**Environmental Monitoring at Hanford for 1988*, PNL-6825, Pacific Northwest Laboratory, Richland, Washington, (1989).

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1.0 INTRODUCTION

1.1 BACKGROUND

Westinghouse Hanford Company (Westinghouse Hanford), as the Operations and Engineering Contractor (OEC) for the U.S. Department of Energy (DOE) at the Hanford Site, has, as a part of its mission, the responsibility to manage the fuel reprocessing and radioactive waste management facilities in the 200 East and West Areas. Westinghouse Hanford also maintains the retired radioactive dry-waste disposal sites in the 600 Area.

The Hanford Site is located within the Pasco Basin in south-central Washington State, approximately 170 mi southeast of Seattle and 125 mi southwest of Spokane. As shown in Figure 1-1, the 200 Areas are almost in the center of the Hanford Site, 7 mi south of the Columbia River. The locations of operating facilities, tank farms, solid waste burial grounds, and liquid disposal sites in the 200 Areas are shown in Figures 1-2 and 1-3.

Westinghouse Hanford conducts the 200/600 Area Operational Environmental Surveillance Program in the 200 Areas, the BC Crib Area, and the 600 Area to assess and control the impact of past and present operations on the local environment.

1.2 OBJECTIVES OF THE OPERATIONAL ENVIRONMENTAL SURVEILLANCE PROGRAM

The objectives of the 200/600 Area Operational Environmental Surveillance Program are to evaluate the following:

- Compliance with DOE and internal Westinghouse Hanford radiation protection guides
- Performance of radioactive waste confinement systems
- Long-term trends of radioactive materials in the environment.

Environmental protection requirements for use in the 200 Areas have been developed using administrative control values (ACVs) (Appendix I) to limit radionuclide concentrations. These control limits were established to implement a DOE policy to maintain occupational radiation exposures to levels that are as low as reasonably achievable (ALARA) (DOE 1986) and to assume that offsite limits are not exceeded. Operational environmental monitoring is an essential component to demonstrate compliance with these requirements and policies. For these reasons, the scope of the Westinghouse Hanford 200/600 Area operational environmental monitoring program has been designed to meet the site-specific needs of the 200 and 600 Areas.

This report presents and interprets the results of the operational environmental surveillance activities performed by Westinghouse Hanford in the 200 and 600 Areas during 1988.

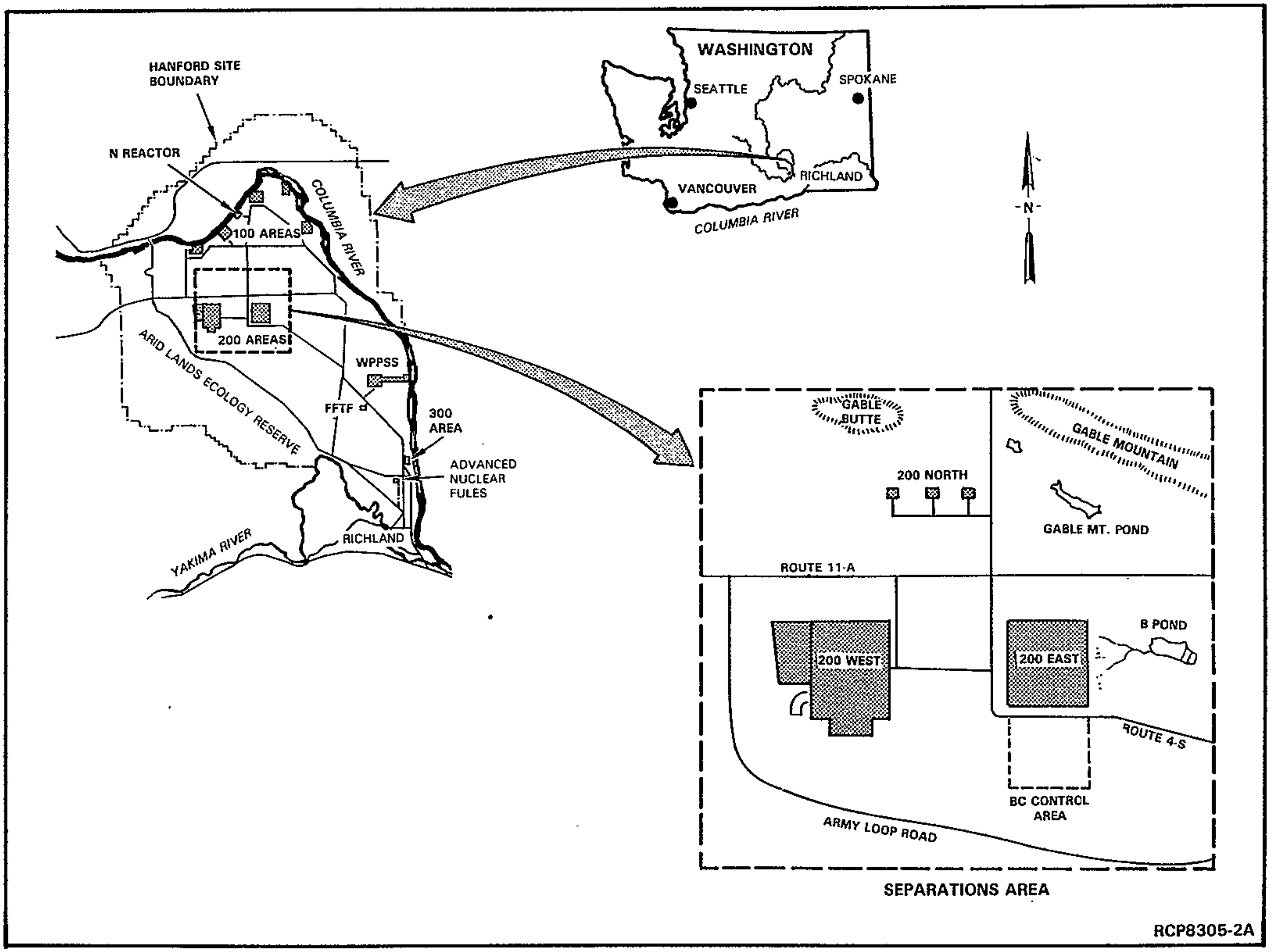

Figure 1-1. The Separations Area of the Hanford Site.

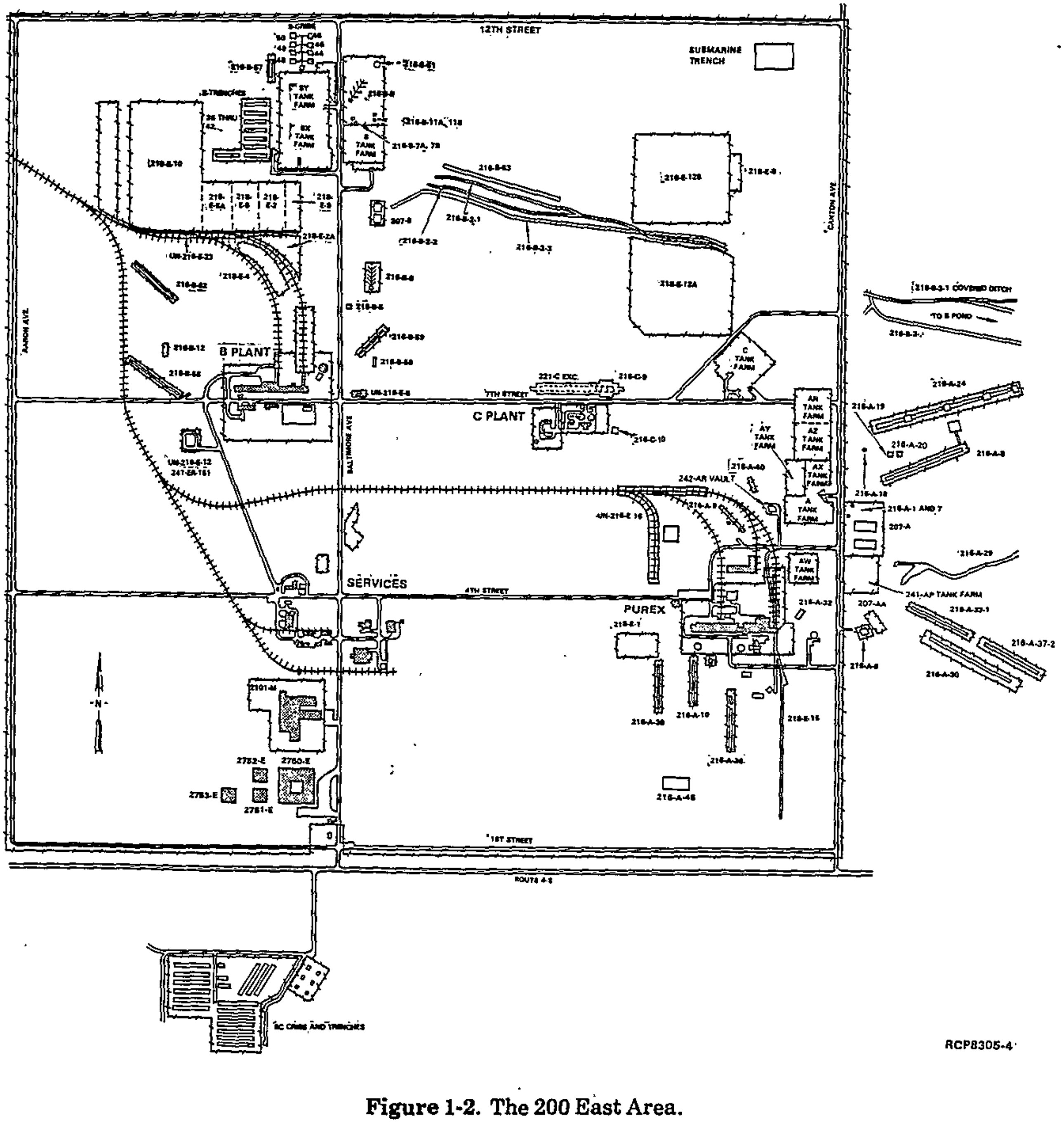

Figure 1-2. The 200 East Area.

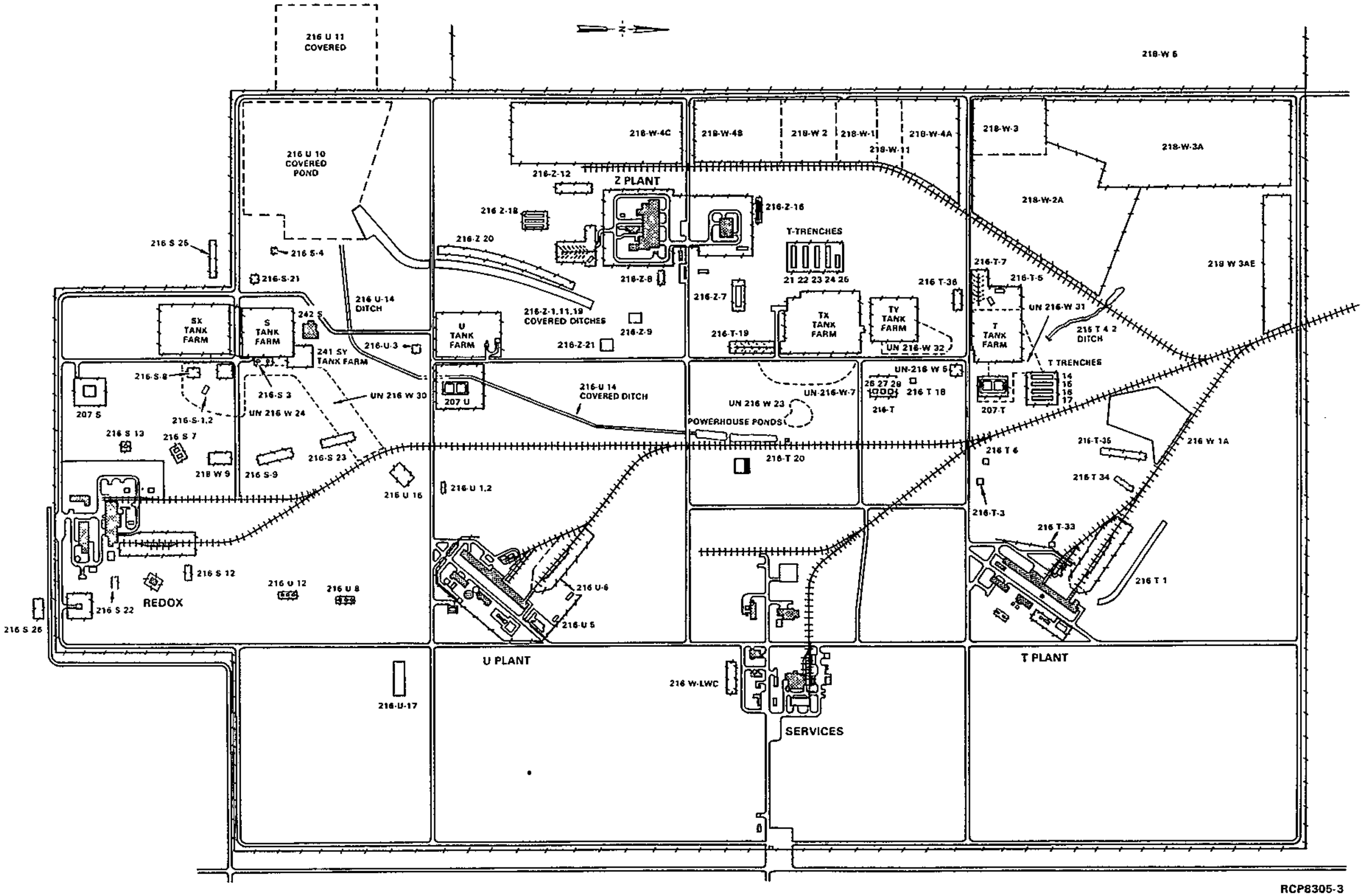

Figure 1-3. The 200 West Area.

1.3 SITE CHARACTERISTICS

1.3.1 Chemical Processing Facilities

1. PUREX Plant--The Plutonium Uranium Extraction (PUREX) Plant processes irradiated fuels from N Reactor to recover special materials (e.g., plutonium, neptunium, and uranium) and produces plutonium nitrate or plutonium oxide and uranyl nitrate. This process includes metal dissolution and solvent extraction. Supporting systems provide for the removal of nitric acid and organic compounds and the concentration and treatment of waste.

2. UO_3 Plant--The Uranium Oxide (UO_3) Plant is used to produce UO_3 powder by calcining uranyl nitrate solutions from the PUREX Plant. The UO_3 powder is sealed in steel drums for shipment offsite.

3. PFP--The Plutonium Finishing Plant (PFP) is used to process and prepare plutonium products. At the PFP, the Plutonium Reclamation Facility produces plutonium nitrate and the Plutonium Processing Facility converts plutonium nitrate to either plutonium oxide or metal.

4. T Plant--The T Plant was originally a fuel separation facility using the bismuth phosphate process. The facility is now used for decontamination and repair of equipment.

1.3.2 Waste Management Facilities

1. Tank Farms--Liquid waste from chemical processing operations containing high concentrations of radionuclides is stored on an interim basis in underground tanks. The Hanford Site tank farms contain 177 tanks (149 single-shell tanks and 28 double-shell tanks) with capacities ranging from 50,000 to 1,000,000 gal. Since 1967, new liquid waste has been stored in double-shell tanks. The single-shell tanks are no longer receiving waste and are planned for disposal.

   Associated with the tank farms are the evaporators. These facilities are used to remove water from the liquid waste, thereby reducing the total volume of waste stored by the tank farms. During 1988, the 242-A Evaporator was operational and the 242-S Evaporator was on standby.

2. B Plant/WESF--The scope of work for B Plant and the Waste Encapsulation and Storage Facility (WESF) is in a state of change. Limited amounts of ^{137}Cs were shipped to customers in 1988; however, current encapsulation processes for ^{90}Sr and ^{137}Cs at WESF are on standby. Upgrades are under way at B Plant to prepare for supporting the vitrification and grout projects.

3. Cribs--Low-level liquid waste is discharged to the ground via structures called cribs. These subsurface systems allow the liquid component of the waste to percolate into the soil. Of the 97 cribs in the Separations Area, 12 were active in 1988. The 216-U-12 Crib was removed from service and the 216-U-17 Crib was activated.

4. Ponds--Ponds are used to manage the large quantities of water (i.e., cooling water and steam condensate) associated with chemical processing operations. These liquid effluents are normally uncontaminated. The ponds function to promote percolation of the liquid effluent into the soil column. Of the 16 ponds in the Separations Area, 2 remained active by the end of 1988.

5. Ditches--A ditch is an open, unlined excavation used for disposing of liquid effluents or transporting liquid effluents to ponds for disposal. Of the 18 ditches in the Separations Area, 5 were active in 1988.

6. French Drains and Reverse Wells--These are pipes or rock-filled encasements inserted into the ground. These subsurface systems are used for managing potentially contaminated liquid waste by promoting percolation into the soil. Of these 37 process facilities in the 200 Areas, 5 French drains were active in 1988. These facilities terminate 200 or more feet above the groundwater. The 216-C-2 Reverse Well was removed from service with the completion of Decontamination and Decommissioning of C Plant (Hot Semiworks) in 1988.

7. Solid Waste Disposal Sites--Contaminated solid waste is generated by various activities on the Hanford Site. This waste is buried in shallow trenches in the 200 Areas. The particular waste packaging procedures and burial practices depend on the type of waste. Of the 27 solid waste disposal sites in the 200 Areas, 7 remained active in 1988.

1.3.3 Decontamination and Decommissioning

Westinghouse Hanford activities in the 200 Areas also involve decontamination and decommissioning of retired facilities, equipment, and waste disposal sites. These activities are aimed at preventing the release or spread of contamination and/or reducing the number of Radiological Control Areas.

2.0 AMBIENT AIR MONITORING

2.1 INTRODUCTION

Ambient air sampling is conducted to determine baseline concentrations of radionuclides in the 200 Areas and to assess the impact of operations on the local environment. These measurements also provide an indication of the 200 Areas facility performance and are used to demonstrate compliance with environmental protection criteria. The Westinghouse Hanford air sampling program in the 200/600 Area, as illustrated in Figures C-1, C-2, and C-3, takes into consideration prevailing and high wind directions, as well as potential source terms. Meteorological conditions are continuously monitored by Battelle's Pacific Northwest Laboratory (PNL) meteorology stations positioned around the Hanford Site.

In 1988, four new permanent air sampling stations were established, bringing the total number of permanent stations to 50. These stations are N006, N007, N008 and N012, located, respectively, north, south, and east of the 241-AP Tank Farm and northeast of 207-A Retention Basin. In conjunction with the routine particulate filters at these four stations are Silver Zeolite (AgX) Cartridges for monitoring of gaseous radioisotopes. An AgX Cartridge was also added to the existing station at the east air intake of 272-AW. In addition to these permanent stations, four temporary stations were set up to monitor the Decontamination and Decommissioning (D&D) efforts at the Strontium Semi-works in 200 East Area. All Westinghouse Hanford air samplers in the 200 and 600 Areas are operated at a flow rate of 2 ft^3/min, drawing the sample through a 47-mm, open-face filter at about 3 ft above the ground.

The network of 50 air samplers operates on a continuous basis in and around the 200 Areas. Three of the 50 samplers are distant from the 200 Areas to provide background data: one each at the Yakima and Wye Barricades and one at the Hanford Townsite. All sample filters are exchanged weekly, held one week (to allow for decay of the short-lived natural radioactivity), and then sent to the 222-S Laboratory for initial analysis of gross alpha and gross beta activity. These initial analyses serve as an indicator of potential environmental problems. After the initial analysis, the filters are stored until the end of the calendar quarter, at which time they are composited by sample location (or as deemed appropriate) and sent to the U.S. Testing Company, Inc. (UST) Laboratory for specific radionuclide analysis. Of the analyses performed, four are routinely reported: ^{137}Cs, ^{90}Sr, ^{239}Pu, and total uranium. The compositing of the air filters by sample location provides a larger sample size and, thus, a more accurate measurement of the concentration of airborne radionuclides resulting from operations in the 200 Areas. To help access the impact of operations, the results obtained must be compared to background data. Because of the sensitivity of air monitoring to the sampling techniques, direct comparisons to background data from PNL cannot be made (e.g., PNL collects a larger sample per filter and composites multiple sites). Therefore, Westinghouse Hanford set up the three distant stations to obtain background data using sampling techniques identical to the rest of the program.

2.2 AIR SAMPLING RESULTS, 1988

2.2.1 Summary

The concentrations of airborne radionuclides measured in 1988 in the 200 Areas were many times less than the DCG. The 1988 air sampling results are summarized in Tables C-1, C-2, and C-3.

Annual average radionuclide concentration since 1979 are illustrated in Figures C-4 through C-9. All sites were well below the applicable DOE guidelines (DCG--Appendix I) in 1988. The following are brief discussions of the results of the isotopic analysis.

2.2.1.1 Strontium-90 Results. The highest annual average result for ^{90}Sr was at N003, southwest of the Strontium Semi-Works in 200 East Area. This is one of four stations set up to monitor the D&D of the Strontium Semi-Works. The result here was 0.0011 pCi/m^3, or only 0.01% of the DCG. For comparison purposes, this was 6.5 times greater than the overall average for ^{90}Sr and 12 times greater than background at Westinghouse Hanford sites.

2.2.1.2 Cesium-137 Results. The highest annual average result for ^{137}Cs was at N157, near the 241-BY Tank Farm in 200 East Area. The result was 0.0022 pCi/m^3, about 0.0006% of the DCG. For comparison purposes, this was 7.2 times greater than the overall average for ^{137}Cs and 23 times greater than background at Westinghouse Hanford sites. No discernable trend has been evident at this site.

2.2.1.3 Plutonium-239 Results. The highest annual average for ^{239}Pu was 0.00042 pCi/m^3 at site N165, near the decommissioned 216-Z-19 Ditch in 200 West Area, only 2% of the DCG. The average was 25 times greater than the overall average and 95 times greater than background at Westinghouse Hanford sites. There has been a very slight upward trend evident since 1983 (about 0.0000565 pCi/m^3/yr, about a 1% increase per year), however, the overall trend (since 1979) for ^{239}Pu in air continues downward in both 200 East and 200 West Area.

2.2.1.4 Total Uranium Results. The highest annual average for total uranium was at site N168, located in the U Plant area near the stack in 200 West Area. The result of 0.00012 pCi/m^3 was 21 times greater than the overall average for total uranium. No total uranium was detected at any of the Westinghouse Hanford background sites. These slightly elevated concentrations are attributed to UO_3 Plant operations.

2.2.1.5 Ruthenium-106 Results. Although no other gamma-emitting radionuclides were found at levels significantly greater than background other than ^{137}Cs, ^{106}Ru results were scrutinized. The ^{106}Ru was selected because of its relationship to the PUREX Plant process and its relatively short half-life. Beginning in 1988, five stations were set up with Silver Zeolite (AgX) cartridges to monitor levels of the gaseous (volatile) radionuclides. At these five stations, only ^{106}Ru was found consistently greater than the detection limit, but then only at very low levels. It was found that the annual average concentrations of volatile ^{106}Ru were from 12 to 24 times greater than the corresponding particulate ^{106}Ru (Table C-4). The highest annual average for volatile ^{106}Ru was at N014, located northeast of the 207-A Retention Basin in 200 East Area. The result was 0.34 pCi/m^3, about 1% of the DCG.

2.3 CONCLUSIONS

Activities in the 200 Areas contributed to average radionuclide concentrations in air only slightly above background. Trends over the past 10 yr have generally been downward for both 200 East and 200 West Area averages because of an overall improvement in operational environmental controls. All radionuclide concentrations were below the DCG in 1988. With the exception of the very slight upward trend of ^{239}Pu at N165, all individual stations for all measured radionuclides have also been showing a generally downward trend as well.

3.0 GROUNDWATER MONITORING

3.1 INTRODUCTION

This section presents the status of the groundwater quality beneath the 200 Areas and associated waste sites in comparison with the Westinghouse Hanford ACVs and the DCGs. The ACVs for the separations area facilities and operations listed in Appendix I. Included are a brief description of Westinghouse Hanford's groundwater monitoring program, concentration summaries for active and inactive waste sites, and a summary of significant concentration trends that began in, or continued into, 1988.

Westinghouse Hanford conducts the 200 Area groundwater monitoring program to determine the compliance status of 200 Area facilities and operations with Westinghouse Hanford's administrative controls pertaining to groundwater quality. The objectives of the program are as follows:

- Evaluate the quality of groundwater beneath the 200 Areas.
- Determine the impact of waste disposal operations on the groundwater.
- Assess the performance of disposal and storage sites in the 200 Areas.
- Provide data for hydrologic analysis and model application.

3.2 MONITORING PROGRAM DESCRIPTION

The groundwater monitoring network for 1988 consisted of 169 wells in the unconfined aquifer and 13 wells in the confined aquifer underlying the liquid-waste disposal and storage sites in the 200 Areas. Monitoring well locations for the unconfined aquifer are shown in Figures D-1 through D-3.

Samples were collected for Westinghouse Hanford by PNL. Wells monitoring active waste disposal sites were sampled monthly. Those monitoring inactive sites were sampled either monthly, quarterly, or semiannually, depending on the operating history or radiological condition of the waste site. Most wells are equipped with dedicated submersible pumps; the remainder are sampled by bailing.

Laboratory analyses of groundwater samples were conducted by UST. The analytical parameters in 1988 included total alpha, total beta, ^{60}Co, ^{90}Sr, ^{99}Tc, ^{129}I, ^{137}Cs, ^{106}Ru, ^{3}H, $^{234,235,238}U$, total uranium, $^{238,239,240}Pu$, and nitrate. Water samples from wells were selectively analyzed for these parameters based on effluent inventories and historical groundwater monitoring results. Sampling quality control is discussed in *Environmental Monitoring at Hanford for 1988* (PNL 1989).

Analytical results are reported by UST to both the 200/600 Areas Environmental Protection Section and the Environmental Engineering and Technology Group. The data are analyzed and reported monthly.

Westinghouse Hanford has established ACVs pertaining to radionuclide concentrations in groundwater. The intent of these ACVs is to ensure that at the end of institutional control and prior to migration to the site boundary, the groundwater beneath the site will meet the 0.04 DCG corresponding to 4 mrem/yr effective dose equivalent for radioactivity from current or future operations. It should be recognized that past accidents and practices may preclude meeting this standard with regard to some isotopes, however, current practices are controlled to meet these limits. The ACVs serve as operating limits regulating discharges to liquid disposal sites and, as such, are more restrictive than the DCGs. Inactive liquid-waste disposal sites, i.e., those no longer receiving waste water, continue to be monitored to detect changes that could indicate a potential problem.

3.3 CONCENTRATION SUMMARY

The annual average concentration of radionuclides in groundwater beneath the 200 Area waste sites was compared to the ACVs, as well as the DCG. It should be noted that the DCG are applicable only at the point of actual exposure to members of the public (off the Hanford Site) and are, therefore, not applicable onsite. Table I-2 presents a comparison of the current ACVs and the DCG. Liquid-waste disposal sites that exceeded the ACVs or the DCG are summarized below according to the contaminant involved.

3.3.1 Tritium

The groundwater beneath two active waste sites exceeded the DCG for tritium in 1987. The 216-A-45 and 216-A-37-1 Cribs, which receive PUREX Plant effluents, were approximately 3 times the DCG. Wells at sites in the vicinity of these cribs also showed ^{3}H concentrations in excess of the DCG. The ^{3}H concentrations in the unused 216-A-38 Crib dropped from 7 times the DCG in 1987, to 2.5 times the DCG in 1988, continuing to indicate plume movement.

3.3.2 Strontium-90

No active waste sites exceeded the ACVs or DCG for ^{90}Sr.

One inactive waste site has elevated concentrations of ^{90}Sr in the groundwater. The groundwater beneath the inactive 216-B-5 Reverse Well had an annual average ^{90}Sr concentration of about 6 times the DCG and 83 times the ACVs. This is unchanged from 1987. The continued elevated ^{90}Sr concentration at this site is due to the past practices of direct discharge of contaminants to the water table. Except for 216-B-5, all reverse wells previously discharged into the vadose zone. This site, however, discharged directly into the water table from 1945 through 1947 (Law and Allen 1984). The high ^{90}Sr concentration was due to residual contamination from that period of operation. Characterization has demonstrated that the radionuclides were sorbed on the sediments and that the contamination is localized (Smith 1980).

The groundwater beneath the inactive 216-S-1 and 216-S-2 Cribs has also historically demonstrated elevated ^{90}Sr concentrations. In 1988, the annual average concentrations were below the ACV, as well as the DCG, and have continued to decrease since the first quarter of 1985, indicating plume dilution and movement. This groundwater ^{90}Sr contamination is also due to past operations.

3.3.3 Technetium-99

Improved analytical procedures which resulted in a lower cost for ^{99}Tc analysis allowed some additional waste sites to be investigated for ^{99}Tc in the groundwater beginning in 1987. One active waste site, the 216-U-17 Crib, exceeded the ACV for ^{99}Tc. The groundwater beneath two inactive waste sites was found to have ^{99}Tc in excess of the DCG. These sites were the 216-U-1 and -2 Crib area and the 241-S area. The source of the ^{99}Tc is from past disposal to these sites. The highest concentration at the 216-U-1 and -2 Cribs was in the furthest downgradient well (299-W19-18) and was 2 times the ACV. The concentration beneath the 216-U-17 Crib was four times the ACV. This elevated ^{99}Tc concentration in the 200 West Area coincides with the elevated uranium concentrations. The ^{99}Tc concentration at the 216-B-48, 216-B-49, and 216-B-50 Cribs, which was above the ACV in 1987, has remained below the ACV in 1988.

3.3.4 Iodine-129

No waste sites exceeded the DCG or ACV for ^{129}I during 1988. Fifteen wells were analyzed for ^{129}I in 1988. Wells at 216-A-10, 216-A-27, 216-A-36B, 216-A-45, and a well east of REDOX (699-35-70) were sampled for ^{129}I. The 216-A-45 Crib, which replaced the A-10 Crib, began receiving the suspected effluent from the PUREX process condensate (which has had a history of elevated levels of ^{129}I) in 1987 and is being routinely sampled for ^{129}I. The concentration of ^{129}I in groundwater beneath the 216-A-45 Crib is at 25% to 50% of the ACV.

3.3.5 Cesium-137

The average annual concentration of ^{137}Cs at the inactive 216-B-5 Reverse Well was below the DCG but was eight times greater than the ACV. The concentration has been decreasing for the past 4 yr.

3.3.6 Plutonium

The DCG for plutonium isotopes were not exceeded in the groundwater beneath the separations areas in 1988. However, two wells which monitor the inactive 216-B-5 Reverse Well were slightly above the new ACV for ^{239}Pu. This was due to more restrictive ACVs being implemented internally within Westinghouse Hanford at the end of 1988. The ACVs were reduced by two orders of magnitude from 120 pCi/L to 1.2 pCi/L (Table I-2).

3.3.7 Uranium

The DCG for uranium isotopes were not exceeded in the groundwater beneath any active waste sites in 1988. However, the groundwater beneath three active sites exceeded the ACVs. The concentrations of ^{234}U and ^{238}U exceeded the ACVs in samples for the second period of the semi-annual sample for the 216-B-62 Crib. The uranium has been determined to be from the nearby inactive 216-B-12 Crib. There is no indication of vadose zone transport of uranium between the 216-B-12 and 216-B-62 Cribs. The contamination is independent of the disposal site operation. This is supported by data which shows a decrease in uranium groundwater concentration beneath 216-B-62 Crib.

The groundwater beneath the 216-S-25 Crib was reported to be above the ACV for ^{234}U and total uranium. The concentrations are marginally above the ACVs and equivalent to the results in 1987.

The concentrations of ^{234}U, ^{235}U, and ^{238}U beneath the 216-U-17 Crib, which will receive the UO_3 Plant process condensate effluent during future operations, were above the ACVs. The contamination is from other waste sites within the 200 West Area. The characterization of the plume will begin in FY 1989, to monitor the expected restart of UO_3 operations.

The groundwater beneath four inactive sites had concentrations of uranium isotopes that exceeded the ACVs. The 216-U-1 and -2 Cribs exceeded the DCG for ^{234}U and ^{238}U. The concentrations reported in 1988, an average of 3.0 times the DCG for ^{234}U and 2.5 times the DCG for ^{238}U, were down from those reported in 1987, an average of 7 times the DCG for ^{234}U and 5.5 times the DCG for ^{238}U. The decline in concentrations of ^{234}U and ^{238}U indicate plume movement. However, wells monitoring the 216-U-17 Crib have not shown an increase in 1988. Remedial pumping of the groundwater beneath these cribs, conducted from June to November 1985, resulted in the removal of 687 kg of uranium.

Another inactive site, 216-U-10 Pond, has ^{234}U and ^{238}U concentrations slightly in excess of the ACV. The concentration remained unchanged in well 299-W18-15 during 1988, but increased in well 299-W23-04, which also monitors the 216-S-21 Crib, indicating plume movement.

3.3.8 Other Radionuclides

No other radionuclides were detected in excess of the ACVs of DCG in any groundwater wells monitoring the Separations Area waste sites.

3.4 TRENDS

All groundwater data are analyzed not only to determine compliance with internal guidelines, but also for trends to detect potential problems and to demonstrate the effectiveness of waste site decommissioning.

Concentration trends in groundwater were observed beneath two active waste sites and at four inactive waste site. The trends are summarized below and shown graphically in Figures D-4 through D-10.

- 216-B-62 Crib: In general, the concentration of uranium in the groundwater beneath this active crib continued to decrease during 1988 (Figure D-4).

- 216-S-25 Crib: A slight increase in uranium concentration is evident in Well 299-W23-10 and a slight decrease in Well 299-W23-09 during 1988 (Figure D-5) following pumping of treated groundwater from the 216-U-1 and -2 Cribs, which ended in November 1985.

- 216-U-1 and -2 Cribs: Of the seven wells surrounding the inactive crib area, the total uranium concentration at six wells showed decreases and one well showed no change during 1988 (Figures D-6 and D-7). The well showing no change was the well furthest downgradient from the cribs. The other five wells are closer and upgradient to the cribs. This suggests movement of the plume and sorption on the soil sediments.

- 216-U-17 and -8 Cribs: Of the six wells adjacent to the new 216-U-17 Crib, four showed a slight increase in uranium during 1988 (Figures D-8 and D-9). The increase in uranium in the region of 200 West Area coincides with a uranium increase beneath the inactive 216-U-8 Crib (Figure D-10). The characterization of the plume to determine the source and extent of the contamination beneath the 200 West Area is scheduled to start in FY 1989 to monitor the expected restart of UO_3 Operations.

3.5 CONCLUSIONS

The groundwater beneath 11 waste sites exceeded the DCG on an annual average for 1988. Two sites were in use, eight were inactive, and one has never been used. None of the sites have projected offsite doses that exceed the DOE limits.

- The annual average for tritium in the groundwater beneath the active 216-A-45 and 216-A-37-1 Cribs was 1 and 2 times the DCG, respectively. This was down from an annual average of 3 times the DCG in 1987 for both cribs. Tritium in groundwater beneath the inactive 216-A-10 Crib had an annual average of 2 times the DCG. This was down from 2.5 times the DCG in 1987. Nearby wells at the 216-A-37-1 and 216-A-10 Cribs have shown increases, indicating plume movement.

- The annual average ^{90}Sr concentration beneath the inactive 216-B-5 Reverse Well was 6 times the DCG, virtually unchanged from 1987 levels.

- The annual average for ^{234}U and ^{238}U in the groundwater at the inactive 216-U-1 and -2 Cribs exceeded the DCG by factors of 3 and 2, respectively. This was down from 7 and 5.5 times the DCG, respectively, in 1987. Concentration changes in the surrounding wells indicate plume movement towards the east.

The groundwater beneath seven sites exceeded internal Westinghouse Hanford ACVs on an annual average, as opposed to nine sites in 1987. Except for ^{3}H, these standards are established at or below the DCG for the short half-life radionuclides, and equal to the maximum contaminant levels (DWS) for long life radionuclides. The following sites have shown an overall decrease from those concentrations reported in 1987:

- Uranium isotopes in the groundwater exceeded the ACV at the active 216-U-17 and 216-S-25 Cribs, the decommissioned 216-U-10 Pond, and the inactive 216-S-21, 216-U-1, and 216-U-2 Cribs.

- The ^{137}Cs and ^{239}Pu concentrations exceeded the ACV beneath the inactive 216-B-5 Reverse Well.

- The ^{99}Tc concentration was greater than the ACV in the groundwater beneath the active 216-U-17 Crib and the inactive 216-U-1 and -2 Cribs.

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4.0 SOIL AND BIOTA MONITORING IN THE 200 AREAS

4.1 INTRODUCTION

The radionuclide content of soil, vegetation, and animal feces is measured to evaluate long-term trends in environmental accumulation of radioactivity in the 200 Areas. Soil samples are collected from a network of 84 grid sampling sites and 30 fenceline sampling plots. The grid sites are 10 by 10 m and are arranged in a grid pattern in 200 East and 200 West Areas. These sites are intended to monitor the overall 200 Area environment without being specific to any potential source. Locations of the grid sampling sites are illustrated in Figures E-1, E-2, E-3, and E-4. The 30 fenceline plots are each 1 by 5 m and were established in 1984 to monitor areas both upwind and downwind of potential sources where contamination, if present, might be expected to accumulate. Locations of the fenceline plots are illustrated in Figures E-5 and E-6. Each soil sample represents a composite of five plugs of soil 2.5 cm in depth by 10 cm in diameter collected from within each sampling site.

Early in the summer of each year, soil samples are collected and submitted for radionuclide analyses. The analyses include those radionuclides expected in the Separations Area (i.e., gamma-emitting radionuclides, strontium isotopes, uranium, and plutonium isotopes). The results are compared to regional background levels that are derived from PNL offsite monitoring data to determine the difference between contributions from 200 Area operations and contributions due solely to natural causes and worldwide fallout. The results are also compared to soil contamination standards (Appendix I) developed for use at the Hanford Site. For the purposes of the disposal of soil, there are now two sets of standards for use at the Hanford Site. The first is a threshold limit, below which the soil can be disposed of without the controls of the LLW Burial Grounds. The intent of this threshold limit is to ensure that individual effective dose equivalents would not exceed 25 mrem/yr total, under any reasonable scenario. The second limit defines when an area needs to posted as a Radiological Control Area. The range between the two limits does not need posting, but when disposing of this soil, it needs to be treated as radioactive. The soil standards are intended for use only at the Hanford Site.

When soil samples are collected from the grid sites, terrestrial vegetation samples (e.g., cutting from growing plants) are also collected to determine accumulation of radioactivity in plants. Analyses are performed for gamma-emitting radionuclides and at selected sites for ^{90}Sr and plutonium isotopes. Comparisons are made with regional background (PNL 1988) data for determining impact due to 200 Area operations.

Special soil and biota (plant and animal) samples are collected for site-specific monitoring or when radiological contamination is known or suspected.

4.2 SOIL SAMPLING RESULTS, 1988

4.2.1 Grid Site Soil Sampling

All 84 grid sites (which included five from the Grout Site) were sampled in 1988. Of these samples, 66 sites demonstrated radionuclide concentrations (for at least one radionuclide) above regional background concentrations; however, none approached Westinghouse Hanford's soil standards (Appendix I). Radionuclide concentrations in soil are listed by area in Tables E-1 and E-2.

4.2.1.1 Cesium-137 Results. The highest ^{137}Cs concentration was, as in previous years, found at grid site 2W23 east of the 241-U Tank Farm in 200 West Area. This site, along with 2W8 (adjacent to the 241-T Tank Farm in 200 West Area) has consistently shown the highest levels of ^{137}Cs since the grid sampling program was initiated in 1978. However, the trend at both sites has been generally downward (since 1978), indicating that the elevated levels of ^{137}Cs in soil are due to past operations of the U and T Tank Farms. The 1988 result for 2W23 was 65 pCi/g, which was approximately 84 times background and 0.3% of Westinghouse Hanford's soil standard for ^{137}Cs.

The highest ^{137}Cs concentration in 200 East Area was at grid site 2E10, located east of the 241-B Tank Farms. Samples from this site have shown concentrations among the highest for ^{137}Cs in 200 East Area; with an upward trend evident since 1983 (see Section 4.2.3). The 1988 result for 2E10 was 35 pCi/g, which was about 44 times background and 0.2% of the applicable Westinghouse Hanford's soil standard.

4.2.1.2 Strontium-90 Results. The highest ^{90}Sr concentration was at grid site 2E17, located west of C Tank Farm in 200 East Area. Samples from this site have historically exhibited among the highest for concentrations of ^{90}Sr. Since 1984 an upward trend has become evident at this site. This is believed to be due to residual low-level contamination from the 1985 C-151 Tank Farm incident (Elder et al. 1986). The ^{90}Sr concentration at this site in 1988 was 3.4 pCi/g (down from 5.2 pCi/g in 1987), which was about 17 times background and 0.6% of Westinghouse Hanford's soil standard.

The highest ^{90}Sr concentration in 200 West Area was at 2W9, located to the east of T Plant. Samples from this site have been among the highest for concentrations of ^{90}Sr since about 1983, which was the beginning of the presently observed upward trend. The ^{90}Sr result for 1988 for this site was 2.1 pCi/g, about 11 times background and 0.4% of the Westinghouse Hanford's soil standard.

4.2.1.3 Plutonium-239 Results. Soil samples with ^{239}Pu concentrations above background have been historically, as well as predominately, found in 200 West Area. The highest concentration found in 1988 was at 2W9, located east of T Plant. Samples from this site have consistently been among the highest for levels of ^{239}Pu in soil since the grid site sampling program began in 1978 with an slight upward trend being evident since 1985. The concentration at this site was 2.4 pCi/g, about 160 times background and 3.2% of Westinghouse Hanford's soil standard.

Other radionuclides were found in the grid site soil samples, but were not significant compared to background and the predominate radionuclides previously mentioned.

4.2.2 Fenceline Soil Sampling

Fenceline sampling sites have a different purpose than the grid sites in that they are designed to be site-specific to facilities where there is a greater potential for radionuclide buildup. Sample sites are located upwind and downwind with respect to the prevailing and high winds to detect any release of radioactive contamination from the facility. Of the 29 sites sampled in 1988, all demonstrated radionuclide concentrations for at least one radionuclide above regional background levels and only one site approached Westinghouse Hanford's internal soil standard. Concentrations are listed in Table E-3.

4.2.2.1 Cesium-137 Results. The highest ^{137}Cs concentration was again found at site U-TF-NE, northeast of the 241-U Tank Farm in 200 West Area. Samples from this site have exhibited elevated levels of ^{137}Cs since initiation of the fenceline sampling program in 1984 but no discernable trend has been evident. The concentration measured in 1988 was 297 pCi/g, about 1.5% of the soil standard. This site has been a posted radiological control area.

The highest ^{137}Cs concentration in 200 East Area was found at site B-TF-NE, located on the northeast corner of the 241-B Tank Farm. Samples from this site have been among the highest measurements of ^{137}Cs. The 1988 concentration represents a significant increase over the previous years. This sample was reanalyzed and the results were within +/- 10% of the previous result. The measured result was 190 pCi/g, approximately 1% of the Westinghouse Hanford soil standard.

4.2.2.2 Strontium-90 Results. The highest ^{90}Sr result was again found at U-TF-NE. Samples from this site have also exhibited the highest results for ^{90}Sr, but no discernable trend is evident. The site is currently within a radiological control area. The measured result was 51 pCi/g, approximately 9% of Westinghouse Hanford's soil standard.

The highest concentration measured in 200 East Area was again at B-TF-SE, on the southeast corner of the 241-B Tank Farm. Samples from this site have also been among the highest measurements of ^{90}Sr, with an upward trend evident since 1986. The concentration at this site was 11 pCi/g, only 2% of Westinghouse Hanford's soil standard.

4.2.2.3 Plutonium-239 Results. The highest ^{239}Pu concentration was found at U-TF-W, on the west corner of the 241-U Tank Farm in 200 West Area. The concentration at this site was 0.57 pCi/g, about 0.9% of Westinghouse Hanford's soil standard. Samples from this site have also been among the highest measurements of ^{239}Pu, but no discernable trend is evident.

4.2.3 Radionuclide Concentration Trends in Soil

Soil sample results were evaluated to determine radionuclide concentration trends for 1978 through 1988. Individual concentrations at each grid site are found in annual reports for these years (Wheeler et al. 1980, 1981; Conklin et al. 1982, 1983, 1984, 1985; Elder et al. 1986, 1987, 1988).

The radionuclide concentration data for soil from both the grid sites and the fenceline sites were reviewed to discern trends of radioactivity in soil. Most sites (both grid and fenceline) exhibited no real trend attributable to current operations. There were no statistically significant differences for the 200 Area grid site averages in the levels of ^{90}Sr, ^{137}Cs, and ^{239}Pu in soil from 1978 to the present (averages are illustrated in Figures E-7, E-8, and E-9). However, some individual sites have shown a marked change and are summarized below. Also summarized below are sites which may not be among the highest concentrations of the subject radionuclides, but, because of trends exhibited, are included. As a rule of thumb, in order to be included the slope of the regression line should be greater than 0.5 pCi/g/yr and/or have a trend of relatively high degree of linearity ($R^2 > .5$). It should be noted that a potential exists for an individual site to show a large difference due only to year-to-year variability resulting from the sampling.

4.2.3.1 Grid Sites Cesium-137 Trends. Five sites (2E4, 2E9, 2E10, 2W9, and 2W14) displayed an upward trend continuing into 1988. Grid site 2E4, located northeast of the 241-B Tank Farm in 200 East Area, had a concentration of 18 pCi/g in 1988, with an upward trend of 2.7 pCi/g/yr since 1983. Two other sites, 2E9 and 2E10, located to the south and east of the same tank farm, respectively, have show similar trends for the same time span. Grid sites 2E9 and 2E10 displayed upward trends of 2.9 and 5.8 pCi/g/yr, respectively, with concentrations of 22 and 35 pCi/g, respectively, in 1988. This, along with radiological survey data, supports the supposition that the B Tank Farm complex does indeed contribute to the levels of ^{137}Cs in the environment. The two sites in 200 West Area which have displayed an upward trend, 2W9 and 2W14, located to the east of T Plant and north of the Power House, respectively, have had smaller increases over a longer period than those in 200 East Area. Grid site 2W9 had a concentration of 6.1 pCi/g in 1988, with an upward trend of 0.4 pCi/g/yr since 1980. Grid site 2W14, with a 3.4 pCi/g concentration in 1988, has displayed an upward trend of 0.3 pCi/g/yr since 1979. While the concentrations observed above are not of concern in and of themselves, the underlying upward trend bears monitoring. The results of future sampling at these sites will be closely monitored.

One site, 2E12, located near the north east corner of 200 East Area, has displayed a downward trend since 1982. It had a concentration of 6.8 pCi/g in 1988 with a trend of -4.7 pCi/g/yr. This is believed to be the result of clean-up of an unplanned release site in 1981, which was located upwind of 2E12.

4.2.3.2 Grid Sites Strontium-90 Trends. One site in 200 East Area, 2E17, located west of the C Tank Farm, has displayed an upward trend beginning in 1984. This trend shows only a slightly positive slope (0.6 pCi/g/yr), resulting in a 1988 concentration of 3.4 pCi/g (down from 5.2 pCi/g in 1987). Given these low levels and the belief that these slightly elevated levels are a result of the 1985 C-151 incident and not current operations, this trend is not believed to be of immediate concern. Results of future sampling will be closely monitored. Two sites in 200 West Area, 2W9 and 2W28, located to the east of T Plant and to the east of the 241-S Tank Farm complex, respectively, have also displayed upward trends. Grid site 2W9 (which had the highest ^{90}Sr concentration in 200 West Area) had a concentration of 2.1 pCi/g in 1988, with an upward trend of 0.3 pCi/g/yr since 1981. This trend has been enough to increase the annual concentrations at 2W9 above both the overall annual and the West Area averages since 1985.

4.2.3.3 Grid Sites Plutonium-239 Trends. One site in 200 West Area, 2W9, located east of T Plant, has displayed an upward trend beginning in 1985. This trend shows only a slightly positive slope (0.8 pCi/g/yr), resulting in a 1988 concentration of 2.4 pCi/g. No other site has displayed as marked a trend for ^{239}Pu.

4.2.3.4 Fenceline Sites Cesium-137 Trends. Two fenceline sites, A-TF-E1 and E3, have displayed an upward trend in ^{137}Cs levels. At A-TF-E1, a trend of 0.65 pCi/g/yr, since 1984, resulted in a concentration of 3.7 pCi/g in 1988. At A-TF-E3, a 10 pCi/g/yr trend since 1985 resulted in a concentration of 40 pCi/g in 1988. Two sites, A-TF-E4 and TX-TF-NE, have exhibited a downward trend as well. At A-TF-E4, a downward trend, since 1985, of -28 pCi/g/yr resulted in a 1988 concentration of 10 pCi/g. At TX-TF-NE, a -18 pCi/g/yr trend since 1985 resulted in a concentration of 4.6 pCi/g in 1988. Both downward trends were due to clean-up activities by D&D in 1987 and 1988.

4.2.3.5 Fenceline Sites Strontium-90 Trends. At two sites, B-TF-SE and S-TF-SE, upward trends in ^{90}Sr have been identified originating in 1986. A trend of 3.9 pCi/g/yr at B-TF-SE resulted in a concentration of 11 pCi/g in 1988. A nearly identical trend of 3.8 pCi/g/yr at S-TF-SE yielded a concentration of 9.8 pCi/g in 1988. It had appeared that contamination originating from the Tank Farms was confined to the local surrounding environment. However, a correlation may exist between the upward trend found at S-TF-SE and the upward trend displayed at grid site 2W28, located east of the S/SX Tank Farms. The results of future sampling at these sites will be closely monitored.

One downward trend in ^{90}Sr, at site A-TF-E4, was identified as well. The trend of -1.4 pCi/g/yr yielded a concentration of 4.1 pCi/g in 1988 at this site. This trend is believed to be a result of clean-up activities by D&D in 1987 and 1988.

4.3 VEGETATION SAMPLING RESULTS, 1988

4.3.1 Grid Site Vegetation Sampling

All 84 grid sites (which included five from the Grout Site) were sampled in 1988. Of these samples, all 84 sites demonstrated radionuclide concentrations (for at least one radionuclide) above regional background levels (PNL 1988). Radionuclide concentrations are listed by area in Tables E-4 and E-5.

4.3.1.1 Cesium-137 Results. The highest ^{137}Cs result was found at grid site 2W23, located east of the 241-U Tank farm in 200 West Area. The ^{137}Cs concentration there was 1.9 pCi/g, down from 5.2 pCi/g in 1988, about 120 times background.

4.3.1.2 Strontium-90 Results. Of the 84 vegetation samples taken, 47 were analyzed for ^{90}Sr. The highest concentration was again found at 2E17, northwest of the 241-C Tank Farm in 200 East Area. The ^{90}Sr concentration was 7.2 pCi/g, down from 9.9 pCi/g in 1987 and about 170 times background.

4.3.1.3 Plutonium-239 Results. Twenty of the 84 samples taken were analyzed for ^{239}Pu. The highest concentration detected was at 2W33, south of the 241-S Tank Farm, in 200 West Area. The concentration there was 0.08 pCi/g, about 230 times greater than background.

4.3.2 Radionuclide Concentration Trends in Vegetation

The radionuclide concentration data for vegetation were reviewed to discern trends for radioactivity in vegetation. All grid site vegetation concentrations, except one, have exhibited no real trend, indicating that there has been no consistent or wide-spread accumulation of radioactivity in vegetation in the 200 Areas. The one site that displayed an upward trend of ^{137}Cs was 2EC, located east of the Grout Treatment Facility, outside of 200 East Area. While the trend since 1981 at has only been slight (0.08 pCi/g/yr), it has displayed a high degree of linearity ($R^2 = 0.86$) which resulted in a concentration of 0.58 pCi/g in 1988. The results of future sampling at this site will be closely monitored.

There has been no statistically significant differences for the 200 Area averages for ^{137}Cs in vegetation from 1979 to the present. The yearly averages are illustrated in Figure E-10.

4.3.3 Vegetation Control

Several sites in the 200 Areas contain vegetation, primarily tumbleweeds, with the potential for root uptake of contamination from the soil; however, there has been a significant decrease in contaminated vegetation growth since a surface stabilization program was initiated in 1978. This program involves the following:

- Placing additional soil cover over waste sites, thus further isolating the waste from deep rooted vegetation
- Revegetating existing waste sites; tumbleweed growth is inhibited when forced to compete for moisture with other vegetation

- Applying herbicide to further hinder undesirable plant growth
- Providing clean surfaces that can be easily monitored for changes in radiological conditions.

The progress in contaminated vegetation control since 1977 is illustrated in Figure E-11.

4.4 GRID SITE FECES SAMPLING, 1988

In 1984, the feces sampling procedure used for sampling at the grid sites was changed so that only fresh (about 1 yr old) feces would be collected. This helped ensure that only the impact for the previous year would be apparent. In 1988, all feces found were estimated to be greater than 1 yr old, therefore no grid site feces samples were taken.

4.5 SPECIAL SOIL SAMPLING, 1988

4.5.1 Audit Soil Samples for Herbicide Residue

Soil samples were taken from 20 groundwater wells in the 200 and 600 Areas in order to determine if there was a herbicide buildup occurring (see Table E-6 for location). Soil samples were analyzed for 2,4,5-T, 2,3,5TP, and 2,4,-D. All results were less than the detection limit of 1 µg/g, indicating that no herbicide buildup was occurring.

4.6 CONCLUSIONS

There are several potential sources of environmental contamination in the 200 Areas, including low-level waste disposal sites, tank farms, and processing facilities. Results from the fenceline sampling sites, in conjunction with the grid sampling sites and several animal transport incidents, continue to support a conclusion that most of the environmental contamination originates from tank farms and related facilities. The major mechanism influencing the migration of radioactive material introduced into the environment is the high winds from the southwest. The near-field Environmental Monitoring Program in the Separations Area has been realigned to stress tank farms, and to initiate corrective action (i.e., cleanup initiated as sources are identified), thereby minimizing adverse environmental impact.

Results from vegetation samples collected in the 200 Areas general environment demonstrated that radionuclide concentrations were slightly above regional background. These concentrations were attributed to root uptake from the contaminated soils and deposition. The surface stabilization program, initiated in 1979, has significantly reduced the amount of contaminated vegetation and the levels of radionuclides in vegetation.

As a result of statistical analysis performed on the data, the following conclusions can be made.

- Most sites, both grid and fenceline, have exhibited no real trend, indicating that any contamination present is probably from activities prior to the initiation of the grid and fenceline sampling programs.
- There were no significant differences for the 200 Areas averages in the levels of ^{90}Sr, ^{137}Cs, and ^{239}Pu in soil from 1978 to the present.

- The highest levels of both ^{137}Cs and ^{90}Sr in soil were found at the fenceline sampling sites. However, the highest levels of ^{239}Pu were found at the grid sites in 200 West Area, indicating that the source of the slightly elevated levels of ^{239}Pu was not the tank farms but probably was historical plutonium operations.

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5.0 EXTERNAL RADIATION MONITORING

5.1 INTRODUCTION

A network of thermoluminescent dosimeters (TLD) is positioned in and around the 200 Areas to monitor exposure rates from external radiation sources (primarily gamma rays). The TLD measurements are taken to determine baseline exposure rates in the 200 Area environment. From these baseline data, the contribution of Hanford Site activities can be discerned and the potential dose due to external exposure to employees can be assessed. The dosimeters measure dose-equivalent rates, reported in terms of mrem/yr, at a specific location.

The environmental TLD measure exposure rates resulting from all types of external radiation sources. These include cosmic radiations, naturally occurring radioactivity in air and soil, fallout from nuclear weapons testing, as well as any contribution from Hanford Site activities.

Each TLD consists of three chips of calcium-fluoride/manganese (Harshaw TLD-400) encased in an opaque capsule lined with 0.025 cm of tantalum and 0.005 cm of lead. Each capsule is placed in a translucent, waterproof, plastic vial, and is mounted about 3 ft above the ground. The TLD are placed at each of the active grid sites, at active and inactive surface-water disposal sites, and at PUREX Plant-related Facilities (tank farms, active cribs and the PUREX Plant fenceline). Four batches of capsules are used (two for the grid and surface-water sites, and two for the PUREX-Plant related facilities) and are exchanged each calendar quarter. Each quarterly measurement is an average of the three chips exposed in the same container. The response of the chips has been calibrated by the PNL Radiation Calibration Laboratory, and results are reported in terms of air dose. Results are compared, where appropriate, with background data collected by PNL at locations distant from the Hanford Site to determine impacts due to 200 Area Operations.

5.2 RESULTS

The TLD data are listed in Tables F-1 through F-4. Generally, all grid and surface-water sites have shown approximately a 10% increase in 1988. This overall increase is believed to be a result of fluctuations in regional background (PNL saw a similar increase), not an actual increase in exposure due to operations (PNL 1989). One site at the PUREX-Plant related facilities has displayed an upward trend in the 1985 - 1988 time period.

5.2.1 Grid Sites

All grid sites are located outside radiological control areas and represent the general environment. The exposure rate measured there did not change significantly from 1987. The range in 1988 was from 85 to 220 mrem/yr as compared to 74 to 204 mrem/yr in 1987 (Elder et al. 1988). The sites that had levels elevated above background were attributed to nearby waste site and/or low-level contamination in the environment.

5.2.2 Surface-Water Sites

All TLD at surface-water sites, except for West Lake, are within radiologically controlled areas located at water-sampling sites (see Section 6.0). As a result of decontamination and decommissioning activities at the 216-A-25 Pond, 216-S-19 Pond, 216-U-14 Ditch and 216-Z-19 Ditch, the exposure rate at these sites dropped to background levels. This resulted in only three sites being slightly above background: the 216-B-63 Ditch, the 216-U-10 Covered Pond, and the 216-B-3 Ditch. Prior to this year, the exposure rate at the U-10 Pond was around background levels. However, the quarterly exposure rate (normalized to annual dose rate equivalent) increased from 61 mrem/yr in the first quarter to 193 mrem/yr by the fourth quarter, yielding a measured total of 112 mrem/yr. This represents an increase of approximately 50% over the 1987 total. The results from this site will be closely monitored. The highest exposure rate for surface-water sites in the Separations Area was at the 216-B-3 Ditch, with an exposure rate of 128 mrem/yr.

5.2.3 PUREX Plant-Related Facilities

In addition, TLD are located at several sites associated with the PUREX Plant operations, including tank farms, active cribs, and the PUREX Plant fenceline. These locations are shown in Figure F-1. The only elevated exposure rate significantly higher than the general Separations Area environment that is attributable to the PUREX Plant operation was observed at the 241-A Tank Farm complex. This facility, which receives high-level liquid waste from the PUREX Plant, had external radiation levels ranging from 83 to 2,200 mrem/yr. These high levels are localized (and few in number -- only three are significantly higher than the grid sites) and therefore have minimal environmental impact. All other TLD measurements at PUREX Plant-related locations were consistent with levels seen in the general Separations Area environment.

5.2.4 External Radiation Trends

Since the TLD program was initiated in 1978 at the grid sites, there has been no overall increase in radiation levels in the 200 Areas. In fact, there has been dramatic localized decreases due to decommissioning efforts. The average annual exposure rate at the grid sites in 200 East and West Area has remained consistent from year to year (as compared to background data), as shown in Figure F-2. The annual average exposure rate at the grid sites in 200 East Area was 103 mrem/yr and in 200 West Area was 109 mrem/yr. The only PUREX TLD site to display an upward trend is at 216-U-12 Crib #2, with a 14.2 mrem/yr/yr trend since 1985. The dose rates from this site will be closely monitored in the future.

5.3 CONCLUSIONS

In 1988, operations in the 200 Area did not contribute significantly to the external exposure rate, as measured by PNL (PNL 1989) in the general environment. Consequently, the exposure rate in the general 200 Areas environment was not significantly different from the exposure rate received offsite from natural sources of radiation. As expected, external radiation levels were elevated at certain grid sites, radiological control areas, and facilities, reflecting the proximity to radioactive waste management activities.

6.0 POND AND DITCH MONITORING

6.1 INTRODUCTION

Water, vegetation, and sediment samples were collected from the active ponds and ditches in 1988. Ponds and ditches in the 200 Areas receive potentially contaminated waste water from the chemical processing plants and other facilities. All water is continuously sampled at the point of discharge to ensure compliance with internal company standards and applicable DOE standards. As an additional operational check, the 200/600 Area Operational Environmental Surveillance Program collects water samples at the ponds and ditches. Sampling locations are shown in Figures G-1 and G-2. Sources of liquid effluents are listed in Table G-1.

Water samples of 1 L are collected on a weekly basis from the active ponds and ditches. The pH is determined each week, then the samples are composited and analyzed monthly for total alpha, total beta, gamma-emitting radionuclides, and ^{90}Sr. Each site has replicate samples taken for 1 mo (4 wk), on a rotating basis. Additionally, a 1 L sample is taken on a quarterly basis from each site for nitrate analysis. Samples of aquatic vegetation are collected from ponds and ditches yearly to determine root uptake of radionuclides from potentially contaminated sediments. Along with vegetation samples, sediment samples are collected to measure the accumulation of radionuclides. These samples consist of a composite of five plugs, each 900 cm^2 by 2.5 cm deep. Both the vegetation and sediments are analyzed for gamma-emitting radionuclides, ^{90}Sr, ^{239}Pu, and uranium.

6.2 RESULTS

6.2.1 Water

Results of water sampling at the ponds and ditches are summarized in Table G-2. Because a large percentage of the results are less than the analytical detection limit, only the maximum and minimum concentrations at each site are presented. The only elevated gamma-emitting radionuclide was ^{137}Cs. The highest monthly ^{137}Cs result of 130 pCi/L was observed at the south sample station at the 216-B-3 Pond. This is only 4% of the DCG (Appendix I). The highest ^{90}Sr concentration, 30 pCi/L, was found at the third overflow of the 216-B-3 Pond and was only 3% of the DCG.

6.2.2 Nonradiological Parameters

Results of nitrate and pH determinations are summarized in Table G-3. The pH annual averages ranged from neutral to slightly basic. The highest annual average pH of 9.5 was found at West Lake, a natural, stagnant seep that receives no effluent. All of the nitrate results were less that the detection limit (approximately 1.2 p/m).

6.2.3 Vegetation

Ten vegetation samples were collected from eight ponds and ditches in 1988. Each sample consisted of growing stems and leaves from predominant plant species at each location.
The vegetation was analyzed for gamma-emitting radionuclides, as well as ^{90}Sr, ^{239}Pu, and uranium with the results reported in Table G-4. Three of the samples taken demonstrated a significant

increase in ^{137}Cs concentrations in 1988. These were in samples taken at the 216-A-29 Ditch, the first overflow at 216-B-3 Pond, the 216-T-4 Ditch. These sites increased, respectively, by 9, 25, and 5 times the previous sample result. However, given the relatively low concentrations detected, any environmental impact is considered insignificant.

6.2.4 Sediment

The results from sampling pond and ditch sediments are provided in Table G-5. The highest ^{137}Cs result was found at the 216-T-4 Ditch. The concentration measured in 1988 was 2,550 pCi/g, about 13% of Westinghouse Hanford's soil standard. This represents a 15x increase over the 1987 result, and given the historical data at this site, is believed to be statistically a "flier." However, of the two sites which demonstrated a significant increase in ^{137}Cs in 1987, only one has maintained the elevated levels into 1988: the 216-B-3-3 Ditch. This site had a 1988 result of 108 pCi/g (as compared to 134 pCi/g in 1987). The south station at the 216-B-3 Pond, which displayed a significant increase in 1987, returned in 1988 to historically normal levels with a result of 5.7 pCi/g. Only one site displayed a significant increase in ^{90}Sr levels in 1988: the 216-B-63 Ditch. The concentration in 1988 (which was also the highest measured) was 129 pCi/g, a 76x increase over the 1987 concentration.

6.3 CONCLUSIONS

While there were some significant increases in radioactivity observed in ponds and ditches in 1988, none of these levels exceeded the applicable standards. All surface waters associated with Separations Area operations were below the DCG for all radionuclides. The analytical results of vegetation samples taken at the ponds and ditches revealed that while there was some physiological uptake of radionuclides, the amounts were relatively insignificant. Sediment samples taken demonstrated elevated levels (above background) of mainly ^{137}Cs. However, all ponds and ditches that receive potentially contaminated water are within posted radiological control areas.

7.0 RADIOLOGICAL SURVEYS

7.1 INTRODUCTION

Radiological surveys are conducted to determine changes in the radiological status of the 200/600 Area environment. Trends in radiation levels or radiological contamination may aid in assessing the adequacy of the waste containment of underground radioactive material, indicate movement of radioactive material away from radiological control areas, or detect releases that might otherwise go undetected. The survey schedule is outlined in Table H-1.

7.2 ROADS

A beta-gamma detector, mounted approximately 20 in. above the ground on the underside of a truck, is used to survey the Separations Area road surfaces. The detector consists of four 1B85 Geiger-Muller tubes connected to a count-rate meter in the cab of the truck. All frequently traveled blacktop and improved roads and parking lots in and around the 200 Areas are surveyed bimonthly to detect the presence of radioactive material. Roads less frequently traveled or with low contamination potential are surveyed either quarterly or semiannually. Other roads on the Hanford Site are surveyed by PNL. No new contamination was detected on the roads in 1988.

7.3 PONDS AND DITCHES

Open pond and ditch banks are routinely surveyed to identify contamination at these sites. The thin-window, pancake-type Geiger-Muller probe with the BNW-1 count-rate meter is the principal instrument used in these surveys. No new contamination was detected at the ponds and ditches in 1988.

7.4 DRY-WASTE DISPOSAL SITES

The retired dry-waste disposal sites are surveyed annually to detect radiological changes, primarily via biological intrusion (indicative of loss of control), from year to year. These sites are located in the 600 Area (Figure H-1) and in the 200 Areas (see Figures 1-1 and 1-3).

Spotty contamination was found on the 218-E-2 (maximum of 1,500 counts/min), 218-E-12A (dose rate to 5 mrad/h), and the 218-W-2A (2,000 to 50,000 counts/min due to termite intrusion) Burial Grounds and at the 218-W-7 (maximum of 20,000 counts/min) and 218-W-9 (maximum of 6,000 counts/min) Burial Vaults. The contamination on the 218-E-2 and -12A burial grounds has been cleaned up. The contamination on the 218-W-2A, -7, and -9 Burial Ground and Vaults has been scheduled for cleanup. Two areas of subsurface contamination outside of the 618-5 Burial Ground were detected. The radiation zone in this area has been extended and reposted.

7.5 LOW-LEVEL LIQUID-WASTE DISPOSAL SITES: ACTIVE AND INACTIVE

Low-level liquid-waste disposal sites, other than ponds and ditches, consist of cribs, french drains, reverse wells, trenches, and unplanned release sites. As with dry-waste disposal sites, liquid-waste sites are surveyed at least annually, and as often as quarterly, to detect changes in surface radiological conditions. The most significant results in 1988 are listed below.

7.5.1 216-B Sites

One site, the 216-B-64 Retention Basin, was found contaminated to 1,500 counts/min due to ant intrusion. The area affected was approximately 30 ft^2.

7.5.2 216-S Sites

Two sites, the 216-S-6 and -8 Cribs, were found to be contaminated to a maximum of 20 mrad/h. Contamination at the 216-S-8 Crib has been cleaned up. The contamination at the 216-S-6 Crib is scheduled for cleanup.

7.5.3 216-T Sites

One area, which includes the 216-T-26, -27, and -28 Cribs, was found to be contaminated to 3,000 counts/min outside of the established radiation zone. A new radiation zone was established and this area is scheduled for cleanup.

7.5.4 216-U Sites

Two stabilized sites, the 216-U-10 Pond and the 216-U-11 overflow area, were found contaminated to a maximum of 1,000 counts/min. These sites are scheduled for cleanup.

7.5.5 Unplanned Release Sites

The most noteworthy contamination was found at the following unplanned release sites.

- Spotty contamination and vegetation intrusion (to 2,500 counts/min) was found over underground pipeline running from 224-U to the 216-U-8 Crib. The area is scheduled for cleanup.
- Spotty contamination (to a maximum of 700 mrad/h) was found on the 200 East-West transfer line. Some cleanup work has been completed and the remaining area is scheduled for cleanup.

7.6 TANK FARM PERIMETERS

Tank farm perimeters and associated facilities are surveyed annually to detect any migration of contamination.

Tank farms and related facilities are sources of environmental contamination. Significant contamination was found along the perimeters of the following tank farms: 241-C to a maximum of 40,000 counts/min; 241-B to a maximum of 5 mrad/h; 241-BX and -BY to a maximum of 30 mrad/h; 241-A complex to a maximum of 5 mrad/h; 241-SX and -SY to a maximum of 15 mrad/h. Because of the nature of the problem around tank farms (e.g., surface contamination within the tank farms migrating to the environment), the schedule for cleanup of these areas around the tank farms has yet to be determined. It is planned that the interior of the tank farms will be cleaned up prior to the fence lines to prevent recontamination. Contamination from tank farms has been on the decrease because of ongoing isolation and surface cleanup inside these areas.

7.7 BC CRIBS AND CONTROLLED AREA

The BC Cribs and trenches (Figure H-2) are a series of liquid-waste disposal sites that were active in the mid-1950s. In 1959, it was discovered that animals had burrowed into one trench and transported radioactivity over an area estimated to exceed 2,500 acres. In 1979, special survey plots were established throughout the Controlled Area to monitor for migration of the contamination. Data accumulated during the 10-yr period, including 1988, indicate that no significant migration of contamination away from the areas has occurred. The cribs and trenches were surface stabilized by 1982.

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APPENDIX A

QUALITY ASSURANCE

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QUALITY ASSURANCE

Quality Assurance (QA) may be defined as the actions necessary to ensure accuracy of a program. The Westinghouse Hanford Company (Westinghouse Hanford) environmental surveillance QA program consists of procedures and guides to demonstrate that environmental monitoring techniques and analyses are performed within established limits of acceptance. A sound QA program for environmental monitoring is essential in maintaining credibility.

Written operating procedures are an integral part of the Westinghouse Hanford environmental surveillance QA program. Procedures for field operations are provided in an internal Westinghouse Hanford manual. Emergency response and other special procedures may be documented separately. This appendix briefly describes the essential components of the Westinghouse Hanford environmental surveillance QA program.

DOCUMENTATION

Record keeping is a vital part of any environmental monitoring program. Maintenance of environmental data is not only important from a QA standpoint, but also from a regulatory point of view, for trend analysis, and for optimizing environmental monitoring procedures. For these reasons, each phase of the Westinghouse Hanford Operational Environmental Surveillance Program is documented. This documentation includes sampling logs, annual reports, and unusual occurrence reports.

SAMPLE REPLICATION

Replicate sampling and subsequent analysis are the primary means of assessing sample variability. Duplicate samples of air, water, soil, sediment, and vegetation are collected as part of the routine Environmental Surveillance Program.

DATA ANALYSIS

Environmental data are reviewed to determine compliance with applicable Federal and Company guides. The data are analyzed both graphically and by standard statistical tests to determine trends and impacts on the environment. Newly acquired data are compared with historical data and natural background levels. Routine environmental data are stored on both magnetic media (i.e., in a microcomputer environment) and on hard-copy printouts.

TRAINING

To ensure quality and consistency in sample collection and handling, all personnel performing such work receive formal training. All Westinghouse Hanford Radiation Protection Technologists (RPT) are required to complete a certification program through the Westinghouse Hanford Health Physics Department. In addition, those RPT assigned to environmental programs receive special classroom orientation and on-the-job training by experienced personnel. Environmental Protection personnel receive training in such courses as "Radiation in the Environment," taught through the Tri-Cities University Center, courses taught at the Harvard School of Public Health, and various short courses.

SAMPLE FREQUENCY

The frequency of sample collection varies according to the importance of the measurement. Media sampled more frequently are critical in determining immediate releases to, or impacts on, the environment. A brief description of the sampling program is presented below.

1. Ambient air sample filters and water samples from active ponds and ditches are collected weekly.

2. Radiological surveys of 200 East and 200 West Area roads are performed on a monthly or bimonthly basis, as stated in Section 7.0.

3. The TLD at grid sites, ponds, and ditches are exchanged quarterly.

4. Radiological surveys of waste sites are performed quarterly, semi-annually, or annually depending on the importance, condition, and past history of the site.

5. The soil, vegetation, and fecal samples are collected at the grid sites on an annual basis. Mud and vegetation samples from active ponds and ditches are also collected on an annual basis.

ANALYTICAL PROCEDURES

Three laboratories provide analytical support to the Westinghouse Hanford Environmental Surveillance Program; these are the United States Testing Company (UST), the Radiation Standards and Engineering Laboratory at Pacific Northwest Laboratory (PNL), and the Westinghouse Hanford 222-S Analytical Laboratory. The environmental samples are analyzed in accordance with prescribed procedures and quality control guides. The analytical procedures necessary to implement the environmental monitoring program are briefly described below and are listed according to the respective laboratory.

United States Testing Company

Much of the Environmental Surveillance Program involves measuring radionuclide concentrations at or near background levels. These environmental measurements require a very low detection limit and are typically performed at UST. This analytical laboratory routinely performs analyses on soil, vegetation, animal feces, and air samples. Analyses are performed according to procedures and quality control guides described by the Environmental Measurements Laboratory (1972), the U.S. Atomic Energy Commission (1974), and the National Council on Radiation Protection and Measurements (1976).

1. Air samples

a. Gamma energy analysis--Gamma-emitting radionuclides are measured by direct counting of the air sample filter with a lithium-drifted germanium [Ge(Li)] detector equipped with a multichannel pulse height analyzer.

b. Strontium-90--Airborne ^{90}Sr is determined by leaching the air sample filter with nitric acid and initially precipitating it as a nitrate. The sample is purified by repeated scavenging with barium chromate and precipitating with barium carbonate. The final precipitate, strontium carbonate, is then counted with a low-background gas flow proportional counter.

c. Plutonium--The various plutonium isotopes are leached from the air sample filter with fuming nitric acid and passed through an ion-exchange resin. The plutonium is then eluted from the resin and electrodeposited on a planchet where it is counted using an alpha spectrometer.

d. Uranium--The uranium is leached from the air sample filter and extracted as tetrapropyl ammonium uranyl trinitrate followed by back extraction into water. Following treatment with sodium and lithium fluoride, the aqueous sample is analyzed with a fluorometer.

2. Groundwater samples

a. Total alpha and beta activity--The total activity due to alpha- and beta-emitting radionuclides is measured by directly counting the dried residue with a gas flow proportional counter.

b. Strontium-90--The strontium is removed from the water sample by precipitating as a nitrate using nitric acid. The sample is purified by repeated scavenging with barium chromate and precipitating with barium carbonate. The strontium carbonate is then counted with a low-background gas flow proportional counter.

c. Gamma energy analysis--Gamma-emitting radionuclides are analyzed by directly counting the water sample with a Ge(Li) detector equipped with a multichannel pulse height analyzer.

d. Tritium--Water samples are analyzed for tritium with a liquid scintillation spectrometer.

e. Total uranium--The water samples are analyzed for uranium by first treating with sodium and lithium fluoride followed by analyzing with a fluorometer.

3. Soil Samples

a. Gamma energy analysis--Gamma-emitting radionuclides in soil are measured using a Marinelli beaker and counting with a Ge(Li) detector equipped with a multichannel pulse height analyzer.

b. Strontium-90--The ^{90}Sr is removed from the soil sample by leaching the dried sample with nitric acid. The strontium in solution is converted to an oxalate followed by precipitation as strontium carbonate. The carbonate is deposited on a planchet and counted in the same manner as the ^{90}Sr water samples.

c. Technetium-99--The ^{99}Tc is isolated from other elements using hydroxide carbonate coprecipitation leaving it in solution as the pertechnethe ion (TcO_4^-). Further purification is achieved by an anion exchange column path, followed by liquid scintillation spectrometry.

4. Vegetation samples

a. Gamma energy analysis--Gamma-emitting radionuclides in vegetation are measured by direct counting of the sample with a Ge(Li) detector equipped with a multichannel pulse height analyzer.

Westinghouse Hanford 222-S Analytical Laboratory

The Westinghouse Hanford 222-S Laboratory also provides analytical support to the 200/600 Area Environmental Surveillance Program. This laboratory is the one normally utilized in emergency situations and for samples containing higher than normal environmental levels of radioactivity. Analytical procedures and quality control guides are described by the Environmental Measurements Laboratory (1972), the American Society for Testing and Materials (1976), the American Public Health Association (1980), and the U.S. Environmental Protection Agency (1979). A brief description of the routine analyses performed by the 222-S Laboratory is presented below.

1. Pond and ditch water

a. Total alpha and beta--An aliquot of the pond or ditch water is added to a stainless steel dish and evaporated to dryness. The total alpha and beta activities are measured by direct counting with a gas flow proportional counter.

b. Gamma energy analysis--The liquid sample is sealed inside a geometrically approved container. The gamma-emitting radionuclides are measured by direct counting with a Ge(Li) detector equipped with a multichannel analyzer.

c. Strontium-90--The ^{90}Sr is removed from the aqueous sample by precipitating the ^{90}Sr out with barium carbonate. The strontium carbonate is purified by redissolving with nitric acid, precipitating as a nitrate, and finally precipitating once again as a carbonate. The ^{90}Sr activity is determined by beta counting with a gas flow proportional counter.

d. Plutonium--Actinides are removed from the aqueous sample by precipitation with iron. The precipitate is redissolved in hydrochloric acid and the plutonium separated from the other actinides by ion exchange. The plutonium is electrodeposited on a planchet and counted using alpha spectrometry.

2. Pond and ditch mud and sediment

a. Gamma energy analysis--The gamma-emitting radionuclides are measured by direct counting of the dried sediment sample using a Ge(Li) detector equipped with a multichannel analyzer.

b. Soil leach--Strontium, plutonium, americium, and other radionuclides are leached from the soil sample using a mixture of hydrochloric and nitric acids. The leachate is then analyzed for specific radionuclides as with the liquid samples.

3. Pond and ditch vegetation

a. Gamma energy analysis--The liquid sample is sealed inside a geometrically approved container. The gamma-emitting radionuclides are measured by direct counting with a Ge(Li) detector equipped with a multichannel analyzer.

b. Vegetation leach--The vegetation samples are dry ashed in a furnace and then leached with a mixture of hydrochloric and nitric acids. The leachate is analyzed for specific radionuclides as with the liquid samples.

Pacific Northwest Laboratory Radiation Standards and Engineering

External Radiation (Thermoluminescent Dosimeters)--External radiation levels are measured using TLD. The TLD are located at all grid sampling sites, water sampling sites, and active tank farms and cribs associated with the PUREX Plant operation. The TLD (Harshaw TLD400) consist of three chips of calcium-fluoride/manganese encased in an opaque capsule lined with 0.025 cm of tantalum and 0.005 cm of lead.

The TLD are calibrated, packaged, and read by the PNL Radiation Calibration Laboratory, Radiation Standards and Engineering Department. All TLD work is performed in accordance with the procedures and specific guides from the American National Standards Institute (1975) and PNL (1978).

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APPENDIX B

GLOSSARY

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GLOSSARY

ACV	administrative control value
ALARA	as low as reasonably achievable
DCG	derived concentration guideline
DOE	U.S.Department of Energy
DWS	drinking water standard
EPA	U.S. Environmental Protection Agency
ICRP	International Commission on Radiological Protection
OEC	Operations and Engineering Contractor
PFP	Plutonium Finishing Plant
PNL	Battelle's Pacific Northwest Laboratories
PUREX	Plutonium Uranium Reduction Extraction (Plant)
QA	quality assurance
TLD	thermoluminescent dosimeter
UO_3	Uranium Oxide (Plant)
UST	U.S. Testing Company, Inc.
WESF	Waste Encapsulation and Storage Facility
Westinghouse Hanford	Westinghouse Hanford Company

Aquifer--A subsurface formation consisting of sufficient saturated permeable material to yield significant quantities of water.

Confined aquifer--A subsurface water-bearing region having defined and relatively impermeable upper and lower boundaries.

Unconfined aquifer--An aquifer that has a water table or surface at atmospheric pressure.

Biological transport--Concerns one or more of the following processes:

- Movement of subsurface radioactivity to the surface by physiological plant processes
- Dispersion of such plants by the wind
- Contaminated urine and feces deposited by animals that have gained access to and ingested radioactivity
- Contaminated animals themselves that have ingested radioactivity directly or ingested other contaminated animals or plants
- Physical displacement of radioactivity by burrowing animals
- Nests built using contaminated materials.

Background radiation--Refers to regional levels of radioactivity produced by sources other than those of specific interest (e.g., the nuclear activities at the Hanford Site).

Biota--The plant and animal life of a specific region.

Burial ground--An area specifically designated for the subsurface disposal and/or storage of solid, dry radioactive waste.

Chemical processing--Chemical treatment of material to selectively separate desired components. At the Hanford Site, plutonium, uranium, and fission products are chemically separated from irradiated fuels.

Controlled area--An area where access is controlled to protect individuals from extra exposure to radiation and radioactive materials.

Crib--A subsurface low-level liquid-waste disposal site that allows liquid waste to percolate into surrounding soil.

Decommissioning--The process of removing a facility or area from operation, often involving decontamination and/or disposal, plus incorporating appropriate controls and safeguards.

Decontamination--The removal of radioactivity from a surface or from within another material.

Environmental surveillance--A survey and sampling program designed to determine radiological impact due to site operations.

Groundwater--Water that exists below ground surface (i.e., within the zone of saturation).

Less than detectable--An analytical term for a radionuclide concentration in a sample that is lower than the minimum detection capabilities of that analytical equipment or process.

Operations--In this report this term loosely refers to Westinghouse Hanford activities including chemical processing, waste management, and decommissioning.

Percolation--Downward movement of water through the interstices of unsaturated rock or soil due to gravity or hydrostatic pressure.

PUREX--Plutonium Uranium Extraction (Plant).

Quality assurance--A program designed to maintain the quality of the results of a program within established limits of acceptance.

Radiation survey--Evaluation of an area or object with portable instruments to identify radioactive materials and radiation fields present.

Radiological control area--An area where access is controlled to protect individuals from exposure to radiation and/or radioactive materials. In the Separations Area, control areas include, but are not limited to, areas posted as Radiation Area, Surface Contamination, and Underground Radioactive Materials--all describing the radiological condition of the area within.

Radiological posting--Barriers in the form of signs and chains to prevent access into a radiological control area.

Release from radiological posting--Removal of signs and chain when access to an area no longer needs to be restricted for radiological protection purposes.

Retired waste site--A waste site that is isolated and no longer available to receive waste in any form.

Separations area--The primary area in the Hanford Site where chemical processing and most waste management activities are performed. It includes the 200 Areas and nearby 600 Area sites. Westinghouse Hanford is landlord of the Separations Area.

Surface contamination--A radiological control status that refers to radioactivity on the surface of the ground that exceeds the Soil Contamination Standard.

Surface stabilization--A remedial action program on waste disposal sites that includes the addition of at least 4 ft of clean soil followed by revegetation. It is designed to cover surface contamination and inhibit biological transport.

Tank farm--An area of large underground tanks designed to store up to 1 Mgal each of high-level liquid waste.

Underground radioactive material--A radiological posting status where subsurface radioactivity is present, but where surface contamination is not in excess of the Soil Standards.

Unplanned release site--An area that was contaminated due to an unplanned release of radioactive contamination from a nearby source, making it a radiological control area.

Vadose zone--The unsaturated region of soil or the zone of aeration between the ground surface and the water table.

Thermoluminescent dosimeter--A chip or series of chips used for measuring external gamma radiation. It consists of a material capable of absorbing energy imparted by ionizing radiation, then emitting light as a result of thermal stimulation. A measure of that light is proportional to the radioactivity absorbed.

Waste management--The activity involved with storing, disposing, shipping, handling, and monitoring all radioactive waste.

Water table--The upper boundary of an unconfined aquifer below which saturated groundwater occurs.

Wind rose--A diagram illustrating the distribution of wind directions at a given location during a specific time. It illustrates the direction the wind blows from.

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APPENDIX C

AMBIENT AIR MONITORING FIGURES AND TABLES

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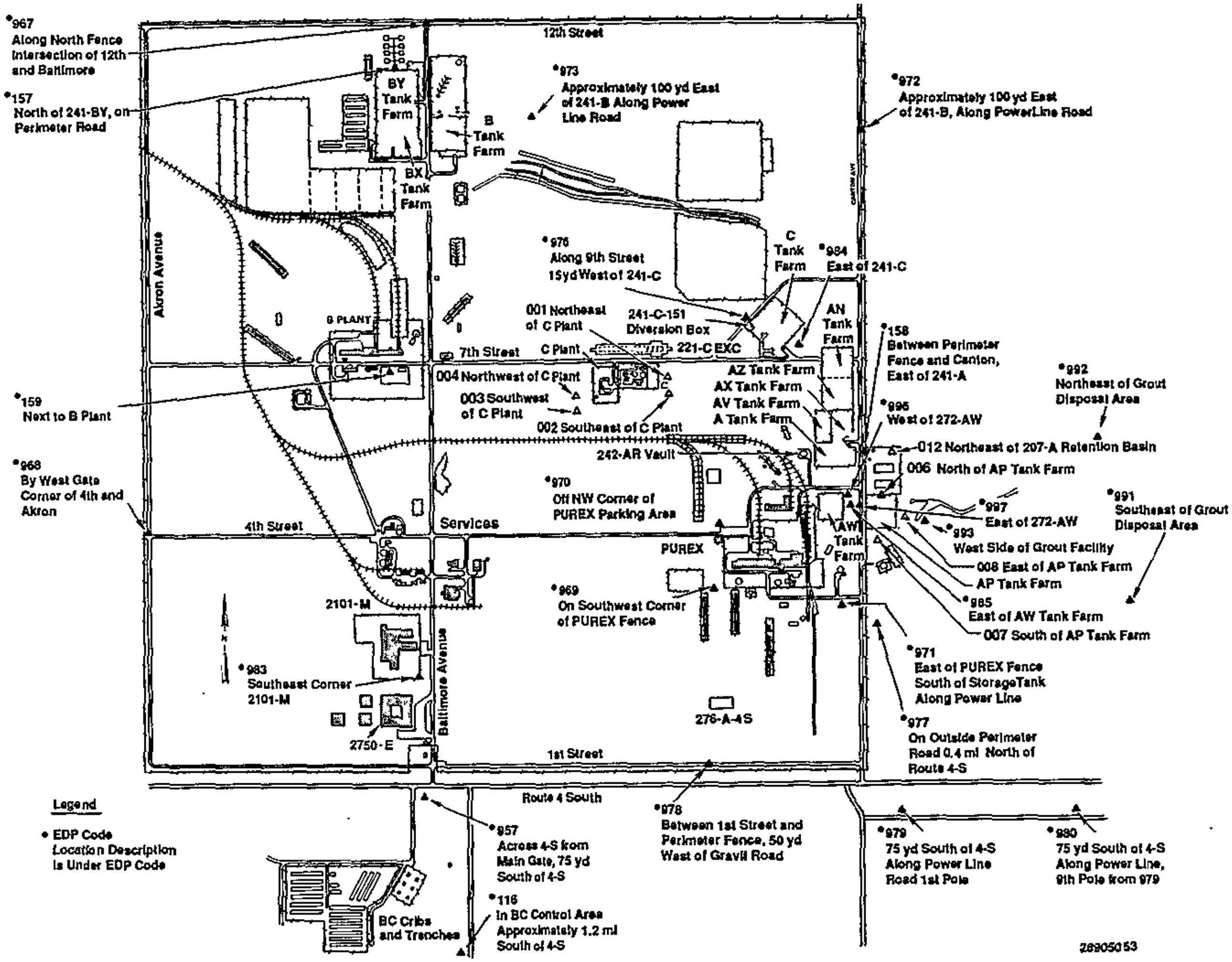

Figure C-1. The 200 East Area Showing Locations of Air Samplers.

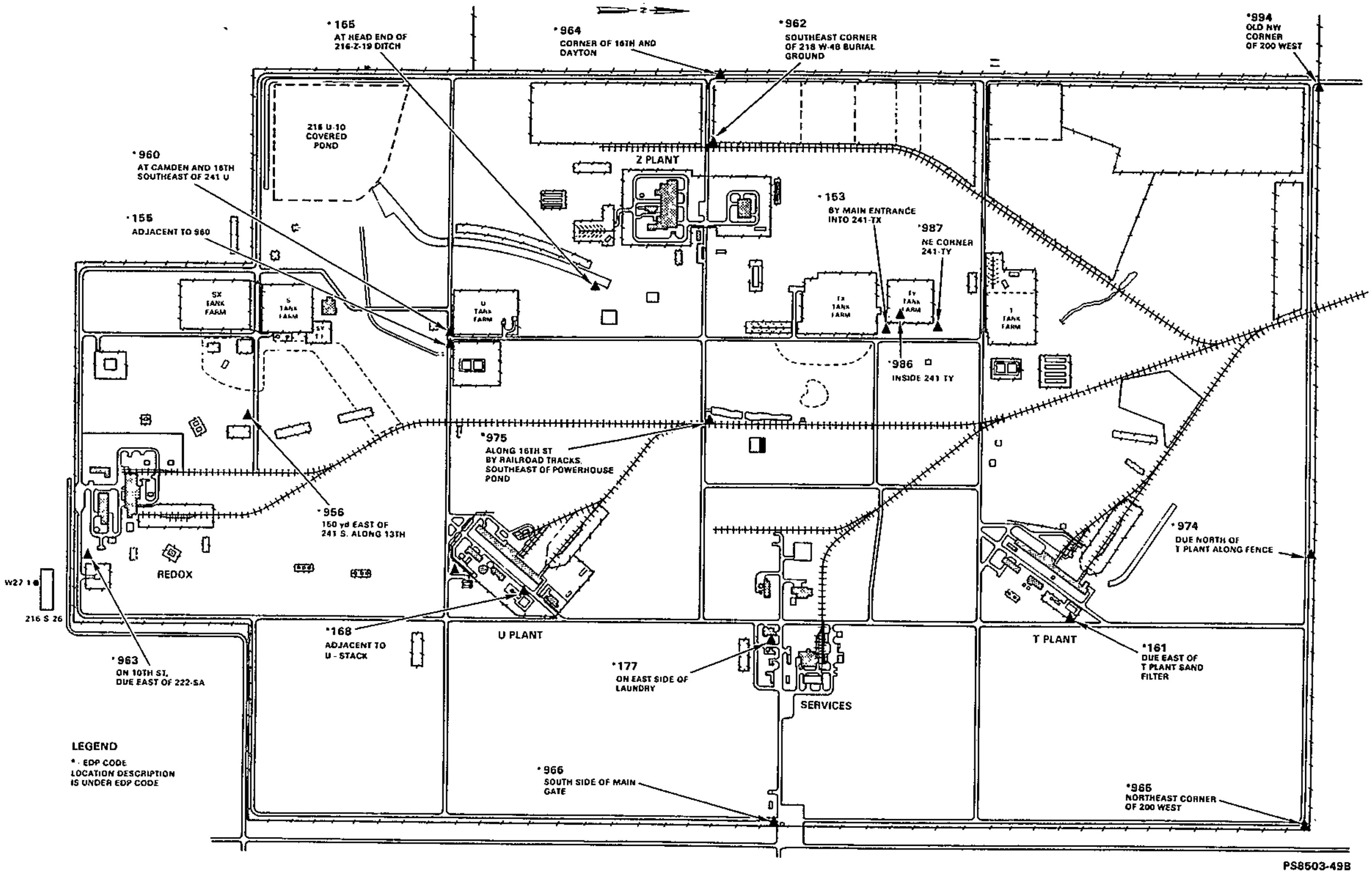

Figure C-2. The 200 West Area Showing Locations of Air Samplers.

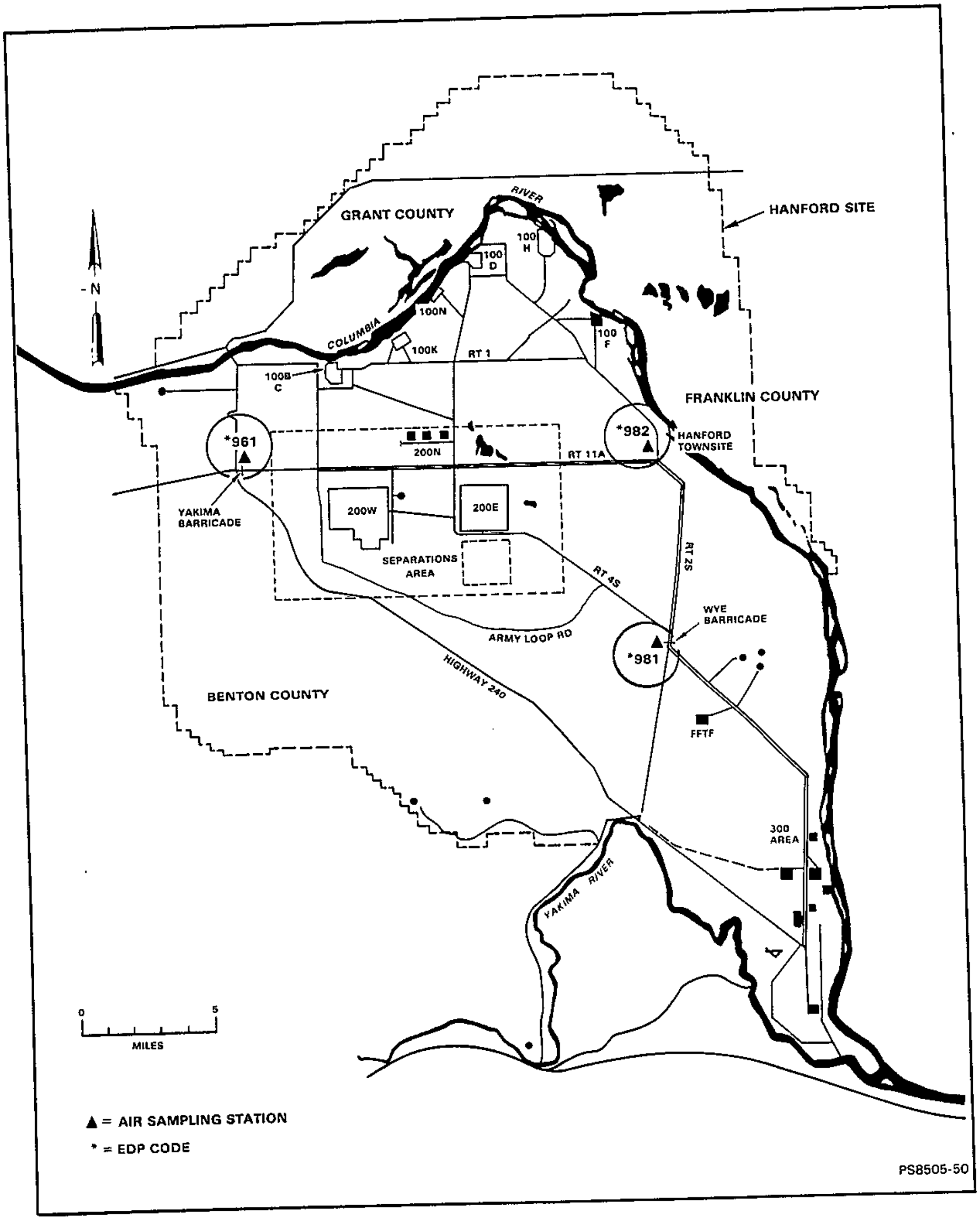

Figure C-3. Westinghouse Hanford Company Air Sampling Stations Away from the Separations Area.

Table C-1. Air Sampling Results for 200 East Area for 1988 (pCi/m^3). (Sheet 1 of 3)

Site	Location	Quarter	Sr-90 ± Error	Cs-137 ± Error	Pu-239 ± Error	U-Total ± Error
N001	NE of Semi Works	1	4.0E-04 ± 1.8E-04	5.6E-04 ± 5.6E-04	6.5E-06 ± 5.8E-06	< -4.1E-06 ± 2.3E-05
		2	8.0E-04 ± 2.9E-04	< -5.8E-04 ± 1.1E-03	6.6E-06 ± 5.8E-06	< 2.8E-05 ± 3.7E-05
Average			6.0E-04 ± 4.1E-4	-9.0E-06 ± 1.2E-3	6.5E-06 ± 1.0E-7	1.2E-05 ± 3.5E-5
N002	SE of Semi Works	1	4.3E-04 ± 1.7E-04	< 9.3E-05 ± 7.3E-04	3.2E-05 ± 1.1E-05	< 5.3E-06 ± 2.4E-05
		2	3.1E-04 ± 1.9E-04	< -1.1E-04 ± 9.2E-04	1.7E-05 ± 9.6E-06	< -6.2E-06 ± 3.6E-05
Average			3.7E-04 ± 1.2E-4	-9.0E-06 ± 2.8E-4	2.4E-05 ± 1.5E-5	-4.7E-07 ± 1.7E-5
N003	SW of Semi-Works	1	2.6E-04 ± 1.4E-04	< 2.2E-04 ± 5.3E-04	< 4.3E-06 ± 4.5E-06	< -1.1E-05 ± 2.2E-05
		2	3.1E-04 ± 1.4E-04	1.5E-03 ± 8.5E-04	< 2.4E-06 ± 2.7E-06	< 5.9E-06 ± 2.0E-05
		3	3.6E-03 ± 9.7E-04	< 2.3E-04 ± 6.1E-04	9.3E-06 ± 4.7E-06	< 7.5E-06 ± 2.2E-05
		4	2.9E-04 ± 1.2E-04	< 2.1E-04 ± 4.1E-04	< -5.2E-08 ± 1.1E-06	< -3.9E-06 ± 1.9E-05
Average			1.1E-03 ± 1.7E-3	5.3E-04 ± 6.5E-4	4.0E-06 ± 4.3E-6	-2.9E-07 ± 8.7E-6
N004	NW of Semi-Works	1	1.9E-04 ± 1.1E-04	7.7E-04 ± 5.3E-04	6.3E-06 ± 4.2E-06	< 3.2E-06 ± 2.0E-05
		2	4.0E-04 ± 1.5E-04	< 3.2E-04 ± 4.7E-04	8.9E-06 ± 4.7E-06	5.1E-05 ± 3.0E-05
		3	6.9E-04 ± 2.6E-04	1.3E-03 ± 1.0E-03	8.5E-06 ± 6.0E-06	1.1E-04 ± 6.1E-05
Average			4.2E-04 ± 3.0E-4	7.9E-04 ± 6.6E-4	7.9E-06 ± 1.9E-6	5.6E-05 ± 6.8E-5
N006	N of AP Tank Farm	1	1.7E-04 ± 1.5E-04	< 3.5E-04 ± 8.2E-04	1.8E-05 ± 9.9E-06	< -1.2E-05 ± 3.0E-05
		2	< 5.8E-05 ± 7.3E-05	< 3.0E-05 ± 6.4E-04	< 2.3E-06 ± 2.6E-06	< -9.6E-07 ± 1.9E-05
		3	9.0E-05 ± 8.3E-05	< 4.2E-04 ± 5.3E-04	< 9.9E-07 ± 1.8E-06	< -2.6E-06 ± 2.2E-05
		4	2.9E-04 ± 1.3E-04	7.1E-04 ± 5.2E-04	4.4E-06 ± 3.4E-06	< -8.4E-06 ± 1.8E-05
Average			1.5E-04 ± 1.1E-4	3.8E-04 ± 3.1E-4	6.5E-06 ± 8.9E-6	-6.1E-06 ± 7.4E-6
N007	S of AP Tank Farm	1	2.0E-04 ± 1.6E-04	< 8.4E-04 ± 1.1E-03	1.2E-05 ± 7.9E-06	< -1.0E-05 ± 3.0E-05
		2	< 2.0E-05 ± 6.9E-05	< 1.3E-04 ± 4.9E-04	< 1.3E-06 ± 2.6E-06	< -3.3E-06 ± 2.1E-05
		3	1.6E-04 ± 9.7E-05	< -9.6E-05 ± 4.0E-04	< 1.7E-06 ± 2.7E-06	3.5E-05 ± 3.3E-05
		4	3.9E-04 ± 1.5E-04	< -2.9E-05 ± 5.2E-04	< 1.5E-06 ± 2.1E-06	< 1.0E-05 ± 2.1E-05
Average			1.9E-04 ± 1.6E-4	2.1E-04 ± 5.3E-4	4.2E-06 ± 6.2E-6	7.9E-06 ± 2.1E-5
N008	E of AP Tank Farm	1	< 3.9E-05 ± 1.3E-04	< -3.0E-04 ± 9.3E-04	< 2.5E-06 ± 8.3E-06	< 1.5E-05 ± 3.4E-05
		2	< 5.4E-05 ± 7.5E-05	< 2.6E-04 ± 7.1E-04	< 2.5E-06 ± 2.8E-06	< -9.3E-06 ± 1.8E-05
		3	1.1E-04 ± 8.2E-05	< 1.5E-04 ± 3.9E-04	< 8.2E-07 ± 2.0E-06	< 2.4E-05 ± 2.8E-05
		4	4.0E-04 ± 1.5E-04	< -3.0E-04 ± 8.5E-04	< 1.9E-07 ± 2.8E-06	< 7.6E-06 ± 2.2E-05
Average			1.5E-04 ± 1.7E-4	-4.9E-05 ± 3.8E-4	1.5E-06 ± 3.2E-6	9.4E-06 ± 1.6E-5
N012	NE of 207-A Retention Basin	3	1.6E-04 ± 1.3E-04	< 8.9E-04 ± 9.6E-04	< 1.5E-06 ± 4.8E-06	< -5.2E-05 ± 3.7E-05
		4	6.6E-04 ± 2.2E-04	5.9E-04 ± 4.3E-04	4.5E-06 ± 3.9E-06	< -4.2E-06 ± 1.8E-05
Average			4.1E-04 ± 5.1E-4	7.4E-04 ± 6.1E-4	3.0E-06 ± 3.2E-6	-2.8E-05 ± 5.1E-5
N116	N of BC Cribs	1	1.6E-04 ± 9.9E-05	7.3E-04 ± 4.8E-04	4.0E-06 ± 3.5E-06	< -8.3E-06 ± 1.8E-05
		2	4.1E-04 ± 1.8E-04	< 1.2E-04 ± 4.5E-04	1.4E-05 ± 6.7E-06	< -4.1E-06 ± 1.9E-05
		3	1.5E-04 ± 9.4E-05	< -2.6E-04 ± 6.2E-04	< 1.2E-06 ± 2.5E-06	< 6.2E-06 ± 2.2E-05
		4	1.6E-04 ± 1.2E-04	< 3.3E-04 ± 4.4E-04	< 1.1E-06 ± 2.0E-06	< -1.2E-05 ± 1.8E-05
Average			2.2E-04 ± 1.3E-4	2.3E-04 ± 4.2E-4	5.1E-06 ± 6.5E-6	-4.7E-06 ± 8.2E-6
N157	241-BY Tank Farm	1	1.8E-04 ± 1.0E-04	4.0E-03 ± 1.1E-03	< 7.2E-07 ± 1.8E-06	< -2.4E-06 ± 1.9E-05
		2	1.1E-04 ± 9.9E-05	2.8E-03 ± 8.6E-04	< 9.4E-07 ± 2.2E-06	< 1.8E-05 ± 2.3E-05
		3	< 8.8E-05 ± 9.2E-05	1.1E-03 ± 7.8E-04	< -5.6E-07 ± 2.1E-06	< -3.3E-06 ± 1.9E-05
		4	< 4.3E-05 ± 9.8E-05	1.0E-03 ± 7.4E-04	1.3E-05 ± 6.9E-06	< 2.5E-08 ± 1.9E-05
Average			1.1E-04 ± 5.9E-5	2.2E-03 ± 1.5E-3	3.6E-06 ± 6.9E-6	3.0E-06 ± 1.0E-5
N158	241-AX Tank Farm	1	6.7E-04 ± 2.2E-04	1.5E-03 ± 9.7E-04	3.0E-05 ± 9.8E-06	< 4.2E-06 ± 2.0E-05
		2	2.3E-04 ± 1.1E-04	1.5E-03 ± 7.9E-04	9.0E-06 ± 6.7E-06	< 1.7E-05 ± 2.3E-05
		3	3.6E-04 ± 1.5E-04	1.7E-03 ± 7.8E-04	< -5.6E-07 ± 5.0E-06	3.7E-05 ± 2.7E-05
		4	1.3E-04 ± 8.9E-05	< 1.8E-04 ± 5.5E-04	4.2E-06 ± 3.4E-06	< 1.0E-05 ± 2.0E-05
Average			3.5E-04 ± 2.4E-4	1.2E-03 ± 7.3E-4	1.1E-05 ± 1.4E-5	1.7E-05 ± 1.5E-5
N159	B Plant	1	8.2E-05 ± 8.0E-05	< -4.5E-05 ± 5.4E-04	5.3E-06 ± 4.5E-06	< -4.2E-06 ± 1.9E-05
		2	1.4E-04 ± 9.2E-05	< 6.9E-04 ± 8.2E-04	5.2E-06 ± 4.6E-06	< 6.4E-06 ± 2.1E-05
		3	1.5E-04 ± 1.1E-04	8.5E-04 ± 6.9E-04	1.6E-05 ± 7.7E-06	< 2.9E-07 ± 1.9E-05
		4	1.7E-04 ± 9.9E-05	< 4.9E-04 ± 6.4E-04	< 1.1E-06 ± 2.5E-06	< 9.5E-07 ± 1.9E-05
Average			1.4E-04 ± 4.1E-5	4.9E-04 ± 4.1E-4	6.9E-06 ± 6.8E-6	8.5E-07 ± 4.4E-6
N957	BC Cribs Near 200 East	1	< 3.1E-05 ± 6.7E-05	< 3.8E-04 ± 4.9E-04	3.7E-06 ± 3.5E-06	< -1.9E-06 ± 1.9E-05
		2	4.2E-04 ± 1.6E-04	< 4.0E-04 ± 6.0E-04	2.5E-05 ± 9.7E-06	< 2.1E-06 ± 2.0E-05
		3	1.4E-04 ± 9.4E-05	< 1.8E-04 ± 5.5E-04	7.9E-06 ± 5.0E-06	< 4.3E-07 ± 2.0E-05
		4	1.4E-04 ± 9.1E-05	< -2.0E-04 ± 7.6E-04	< 1.9E-06 ± 3.0E-06	< -9.6E-06 ± 1.8E-05
Average			1.8E-04 ± 1.7E-4	1.9E-04 ± 3.0E-4	9.5E-06 ± 1.1E-5	-2.3E-06 ± 5.3E-6
N967	N of 241-B and -BY Tank Farm	1	< 5.8E-05 ± 7.2E-05	7.1E-04 ± 6.6E-04	< 1.9E-06 ± 2.8E-06	< -5.1E-06 ± 1.8E-05
		2	< 4.8E-05 ± 7.1E-05	< 2.0E-04 ± 4.6E-04	< 5.5E-07 ± 2.3E-06	< -3.2E-06 ± 1.9E-05
		3	1.9E-04 ± 1.1E-04	< 1.7E-04 ± 5.2E-04	< 8.3E-07 ± 2.1E-06	< 8.6E-06 ± 2.2E-05
		4	2.7E-04 ± 1.3E-04	< 3.2E-04 ± 4.7E-04	< 5.9E-07 ± 1.7E-06	< -3.3E-06 ± 1.9E-05
Average			1.4E-04 ± 1.1E-4	3.5E-04 ± 2.7E-4	9.6E-07 ± 7.6E-7	-7.3E-07 ± 6.5E-6
N968	W gate 200 East Area	1	< 7.6E-05 ± 9.9E-05	< 3.3E-04 ± 5.4E-04	< 1.9E-06 ± 2.5E-06	< 2.2E-05 ± 2.3E-05
		2	< 4.6E-05 ± 7.2E-05	< -2.5E-04 ± 4.5E-04	< -5.7E-07 ± 2.6E-06	< -1.8E-06 ± 1.9E-05
		3	1.1E-04 ± 8.4E-05	< -6.0E-05 ± 5.8E-04	6.2E-06 ± 3.7E-06	4.1E-05 ± 2.7E-05
		4	1.4E-04 ± 1.2E-04	< 0.0E+00 ± 4.9E-04	< 2.5E-08 ± 1.2E-06	< -7.9E-06 ± 1.8E-05
Average			9.3E-05 ± 4.7E-5	4.7E-06 ± 2.5E-4	1.9E-06 ± 3.2E-6	1.3E-05 ± 2.3E-5

Table C-1. Air Sampling Results for 200 East Area for 1988 (pCi/m³). (Sheet 2 of 3)

Site	Location	Quarter	Sr-90 ± Error	Cs-137 ± Error	Pu-239 ± Error	U-Total ± Error
N969	SW of PUREX Plant	1	< 1.6E-05 ± 9.4E-05	< -1.0E-04 ± 5.8E-04	5.5E-05 ± 1.2E-05	5.6E-05 ± 3.1E-05
		2	< 1.3E-05 ± 6.5E-05	< 2.0E-04 ± 6.9E-04	1.3E-05 ± 7.5E-06	2.9E-05 ± 2.6E-05
		3	3.0E-04 ± 1.3E-04	< 1.1E-04 ± 5.2E-04	6.1E-06 ± 3.8E-06	4.7E-05 ± 2.8E-05
		4	2.7E-04 ± 1.4E-04	< 1.5E-04 ± 4.0E-04	< 1.1E-06 ± 2.5E-06	< -1.2E-07 ± 1.9E-05
Average			1.5E-04 ± 1.6E-4	8.9E-05 ± 1.8E-4	1.9E-05 ± 2.5E-5	3.3E-05 ± 2.5E-5
N970	NW of PUREX Plant	1	1.1E-04 ± 1.1E-04	< 2.1E-04 ± 5.0E-04	3.3E-05 ± 1.1E-05	< 1.9E-05 ± 2.3E-05
		2	1.1E-04 ± 8.2E-05	< -1.2E-04 ± 6.8E-04	4.9E-05 ± 1.2E-05	< 2.1E-05 ± 2.3E-05
		3	2.0E-04 ± 1.0E-04	< 3.9E-04 ± 4.6E-04	2.9E-05 ± 8.2E-06	4.0E-05 ± 2.7E-05
		4	2.5E-04 ± 1.3E-04	< -3.0E-04 ± 5.9E-04	1.3E-05 ± 5.7E-06	< -1.7E-06 ± 1.9E-05
Average			1.7E-04 ± 7.2E-5	4.8E-05 ± 3.3E-4	3.1E-05 ± 1.5E-5	2.0E-05 ± 1.7E-5
N971	SE of PUREX Plant	1	1.2E-04 ± 1.1E-04	7.0E-04 ± 6.2E-04	2.5E-05 ± 8.9E-06	< 6.3E-06 ± 2.1E-05
		2	1.4E-04 ± 9.0E-05	< 2.1E-04 ± 4.5E-04	2.4E-05 ± 1.1E-05	< 6.5E-06 ± 2.0E-05
		3	2.7E-04 ± 1.2E-04	< 6.0E-04 ± 6.2E-04	3.1E-05 ± 8.4E-06	< 2.4E-05 ± 2.5E-05
		4	2.2E-04 ± 1.2E-04	< 5.8E-05 ± 5.5E-04	8.0E-06 ± 4.8E-06	< -7.4E-06 ± 1.8E-05
Average			1.9E-04 ± 6.7E-5	3.9E-04 ± 3.2E-4	2.2E-05 ± 1.0E-5	7.4E-06 ± 1.3E-5
N972	NE of 241-C Tank Tarm	1	1.8E-04 ± 1.1E-04	< 5.2E-04 ± 5.9E-04	< 9.8E-07 ± 2.1E-06	< 5.3E-06 ± 2.0E-05
		2	1.9E-04 ± 1.1E-04	1.1E-03 ± 6.9E-04	< 2.2E-06 ± 5.5E-06	< 1.4E-05 ± 2.2E-05
		3	3.0E-04 ± 1.3E-04	< -1.5E-04 ± 5.8E-04	5.8E-06 ± 4.0E-06	< 6.3E-06 ± 2.0E-05
		4	1.7E-04 ± 1.1E-04	< -2.3E-04 ± 6.4E-04	< 1.1E-06 ± 1.9E-06	< 1.2E-05 ± 2.1E-05
Average			2.1E-04 ± 6.0E-5	3.0E-04 ± 6.1E-4	2.5E-06 ± 2.8E-6	9.4E-06 ± 4.4E-6
N973	E of B Tank Farm	1	< 6.7E-05 ± 7.4E-05	8.6E-04 ± 6.7E-04	< 2.3E-06 ± 3.3E-06	< -8.9E-06 ± 1.8E-05
		2	1.1E-04 ± 1.0E-04	< -3.9E-04 ± 6.7E-04	< 1.8E-07 ± 3.0E-06	< -7.9E-06 ± 2.1E-05
		3	1.7E-04 ± 1.0E-04	< 4.3E-04 ± 4.7E-04	4.2E-06 ± 3.4E-06	< -8.0E-06 ± 1.9E-05
		4	1.7E-04 ± 1.0E-04	< 4.5E-04 ± 5.4E-04	6.1E-06 ± 3.8E-06	< 5.8E-06 ± 2.0E-05
Average			1.3E-04 ± 5.0E-5	3.4E-04 ± 5.3E-4	3.2E-06 ± 2.6E-6	-4.8E-06 ± 7.2E-6
N976	2E17, 241-C Tank Farm	1	2.4E-04 ± 1.2E-04	< -1.1E-04 ± 5.3E-04	< 1.5E-07 ± 1.4E-06	< -8.3E-07 ± 1.9E-05
		2	1.7E-04 ± 1.2E-04	< 0.0E+00 ± 5.7E-04	< -1.7E-06 ± 1.6E-06	< 6.1E-06 ± 2.1E-05
		3	5.0E-04 ± 2.0E-04	< 1.7E-04 ± 6.0E-04	< 4.6E-07 ± 1.5E-06	< 2.6E-06 ± 2.1E-05
		4	2.6E-04 ± 1.4E-04	< -6.0E-05 ± 4.0E-04	< 5.5E-07 ± 1.6E-06	< 9.9E-06 ± 2.0E-05
Average			2.9E-04 ± 1.5E-4	-3.0E-07 ± 1.5E-4	-1.3E-07 ± 1.1E-6	4.5E-06 ± 4.7E-6
N977	Grid Site 2E30	1	1.2E-04 ± 1.0E-04	< -9.3E-05 ± 6.3E-04	4.4E-05 ± 1.3E-05	< 1.1E-05 ± 2.3E-05
		2	1.1E-04 ± 1.0E-04	8.5E-04 ± 6.3E-04	8.2E-06 ± 5.6E-06	< -4.0E-06 ± 1.9E-05
		3	2.7E-04 ± 1.4E-04	< 4.6E-04 ± 4.8E-04	4.4E-06 ± 3.2E-06	< -4.3E-06 ± 2.0E-05
		4	2.7E-04 ± 1.3E-04	< -1.1E-04 ± 5.1E-04	3.9E-06 ± 3.2E-06	< 3.5E-06 ± 1.9E-05
Average			1.9E-04 ± 9.1E-5	2.7E-04 ± 4.7E-4	1.5E-05 ± 2.0E-5	1.6E-06 ± 7.6E-6
N978	Grid Site 2E35	1	< 6.3E-05 ± 8.3E-05	< 3.4E-04 ± 5.7E-04	< -1.4E-07 ± 1.5E-06	< -3.0E-06 ± 1.9E-05
		2	< 4.8E-05 ± 6.7E-05	< 2.1E-04 ± 5.3E-04	< 1.2E-06 ± 3.7E-06	< -1.2E-06 ± 1.9E-05
		3	< 4.3E-05 ± 9.4E-05	< -1.0E-04 ± 4.1E-04	< -2.7E-08 ± 2.4E-06	< -8.6E-06 ± 1.8E-05
		4	2.3E-04 ± 1.1E-04	< 2.9E-04 ± 4.7E-04	< 1.1E-06 ± 1.9E-06	< -1.7E-07 ± 1.9E-05
Average			9.5E-05 ± 8.9E-5	1.8E-04 ± 2.1E-4	5.3E-07 ± 1.2E-6	-3.2E-06 ± 3.8E-6
N979	Grid Site 2E36	1	2.8E-04 ± 1.3E-04	4.2E-04 ± 3.6E-04	7.9E-06 ± 4.8E-06	< -4.0E-06 ± 1.8E-05
		2	1.6E-04 ± 9.8E-05	< -1.5E-04 ± 5.1E-04	< 4.1E-06 ± 4.1E-06	< -2.8E-06 ± 1.9E-05
		3	1.6E-04 ± 1.0E-04	< -1.2E-04 ± 4.8E-04	< 4.2E-07 ± 2.4E-06	< -4.3E-07 ± 2.0E-05
		4	2.2E-04 ± 1.1E-04	< -1.5E-04 ± 6.2E-04	< 4.5E-07 ± 1.5E-06	< 8.4E-07 ± 1.9E-05
Average			2.1E-04 ± 5.9E-5	2.5E-07 ± 3.0E-4	3.2E-06 ± 3.9E-6	-1.6E-06 ± 2.3E-6
N980	Grid Site 2EA	1	< 8.0E-05 ± 8.7E-05	< -2.1E-04 ± 5.9E-04	3.4E-06 ± 3.3E-06	< 1.5E-06 ± 1.9E-05
		2	< 4.0E-05 ± 7.1E-05	5.6E-04 ± 5.4E-04	< -5.7E-07 ± 2.4E-06	< -8.0E-06 ± 1.8E-05
		3	< 5.7E-05 ± 7.8E-05	< 0.0E+00 ± 5.9E-04	< 4.7E-07 ± 2.1E-06	< -1.3E-05 ± 1.8E-05
		4	1.5E-04 ± 9.5E-05	< 1.6E-04 ± 5.1E-04	< 1.9E-06 ± 3.3E-06	< 7.4E-06 ± 2.0E-05
Average			8.2E-05 ± 5.1E-5	1.3E-04 ± 3.3E-4	1.3E-06 ± 1.9E-6	-2.9E-06 ± 9.1E-6
N983	SE of 2101-M	1	< 4.7E-05 ± 7.8E-05	< 3.0E-04 ± 6.2E-04	4.3E-06 ± 4.0E-06	< 6.6E-06 ± 2.0E-05
		2	< -1.4E-05 ± 6.0E-05	< 2.7E-04 ± 4.7E-04	< 2.7E-06 ± 3.8E-06	9.0E-05 ± 4.0E-05
		3	2.3E-04 ± 1.2E-04	< 5.9E-04 ± 6.1E-04	6.1E-06 ± 4.1E-06	< -3.1E-06 ± 2.3E-05
		4	1.5E-04 ± 9.2E-05	< 3.3E-04 ± 4.6E-04	< 4.7E-07 ± 2.1E-06	< -8.7E-06 ± 1.8E-05
Average			1.0E-04 ± 1.1E-4	3.7E-04 ± 1.7E-4	3.4E-06 ± 2.6E-6	2.1E-05 ± 4.7E-5
N984	SE of 241-C Tank Farm	1	2.7E-04 ± 1.3E-04	6.9E-04 ± 4.8E-04	5.6E-06 ± 4.0E-06	< 8.7E-07 ± 1.9E-05
		2	8.0E-04 ± 2.6E-04	9.8E-04 ± 6.3E-04	< 2.9E-06 ± 3.5E-06	< -5.6E-06 ± 1.9E-05
		3	2.7E-04 ± 1.3E-04	1.9E-03 ± 7.8E-04	< 1.3E-06 ± 2.2E-06	< -3.3E-07 ± 2.0E-05
		4	3.4E-04 ± 1.6E-04	7.1E-04 ± 5.6E-04	< 4.2E-07 ± 2.0E-06	< -1.6E-06 ± 1.8E-05
Average			4.2E-04 ± 2.6E-4	1.1E-03 ± 5.8E-4	2.6E-06 ± 2.5E-6	-1.7E-06 ± 2.9E-6
N985	E of 241-AW Tank Farm	1	9.8E-05 ± 9.0E-05	< -8.5E-05 ± 6.9E-04	1.0E-04 ± 2.1E-05	< 8.1E-06 ± 2.0E-05
		2	< 7.5E-05 ± 8.1E-05	4.4E-04 ± 4.2E-04	< 2.7E-06 ± 3.8E-06	< 2.4E-06 ± 2.0E-05
		3	2.9E-04 ± 1.3E-04	< 2.3E-04 ± 5.1E-04	9.7E-06 ± 5.3E-06	< 2.4E-05 ± 2.4E-05
		4	1.3E-04 ± 9.2E-05	< -2.5E-05 ± 6.7E-04	1.3E-05 ± 6.2E-06	< 1.7E-05 ± 2.1E-05
Average			1.5E-04 ± 1.0E-4	1.4E-04 ± 2.8E-4	3.3E-05 ± 4.9E-5	1.3E-05 ± 9.7E-6
N991	Grout SE	1	1.5E-04 ± 1.1E-04	< 1.5E-04 ± 4.7E-04	1.1E-05 ± 6.0E-06	< -8.7E-06 ± 2.0E-05
		2	< 2.1E-06 ± 9.2E-05	< 8.7E-05 ± 6.8E-04	< 1.7E-06 ± 2.6E-06	< 3.5E-06 ± 2.0E-05
		3	2.6E-04 ± 1.2E-04	< 6.8E-04 ± 8.3E-04	3.9E-06 ± 3.2E-06	< 1.1E-05 ± 2.1E-05
		4	1.1E-04 ± 1.0E-04	< 1.6E-04 ± 5.1E-04	8.3E-06 ± 4.5E-06	< -1.3E-07 ± 1.9E-05
Average			1.3E-04 ± 1.1E-4	2.7E-04 ± 3.2E-4	6.3E-06 ± 4.5E-6	1.5E-06 ± 8.3E-6

Table C-1. Air Sampling Results for 200 East Area for 1988 (pCi/m³). (Sheet 3 of 3)

Site	Location	Quarter	Sr-90 ± Error	Cs-137 ± Error	Pu-239 ± Error	U-Total ± Error
N992	Grout NE	4	2.7E-04 ± 1.5E-04	< 4.5E-04 ± 5.4E-04	< 5.4E-07 ± 1.8E-06	< 1.3E-05 ± 2.5E-05
N993	Grout NW	1	1.1E-04 ± 9.2E-05	< 2.8E-04 ± 5.2E-04	4.9E-06 ± 4.1E-06	< 7.2E-06 ± 2.0E-05
		2	< 2.6E-05 ± 9.5E-05	< -9.7E-05 ± 5.2E-04	< 2.0E-06 ± 2.6E-06	< 2.0E-05 ± 2.3E-05
		3	3.2E-04 ± 1.4E-04	7.1E-04 ± 6.3E-04	8.0E-06 ± 5.1E-06	4.5E-05 ± 2.9E-05
		4	2.3E-04 ± 1.2E-04	< 3.9E-04 ± 4.8E-04	< 1.5E-06 ± 2.6E-06	< 9.9E-06 ± 2.0E-05
Average			1.7E-04 ± 1.3E-4	3.2E-04 ± 3.4E-4	4.1E-06 ± 3.2E-6	2.0E-05 ± 1.8E-5
N996	W Air Intake 272-AW	1	< 7.8E-05 ± 1.1E-04	< 5.1E-04 ± 6.1E-04	7.3E-06 ± 6.9E-06	< 7.4E-06 ± 2.0E-05
		2	< 5.9E-05 ± 7.7E-05	< -5.3E-04 ± 6.5E-04	< 7.4E-07 ± 2.2E-06	< 5.8E-06 ± 2.0E-05
		3	3.1E-04 ± 1.3E-04	6.2E-04 ± 5.0E-04	< 2.9E-06 ± 3.1E-06	< 1.0E-05 ± 2.4E-05
		4	4.7E-04 ± 1.7E-04	< 3.4E-04 ± 4.9E-04	< -5.6E-07 ± 1.7E-06	< 3.3E-06 ± 2.0E-05
Average			2.3E-04 ± 2.0E-4	2.4E-04 ± 5.3E-4	2.6E-06 ± 4.2E-6	6.7E-06 ± 3.5E-6
N997	E Air Intake 272-AW	1	2.0E-04 ± 1.4E-04	< 2.9E-04 ± 4.7E-04	< -5.6E-07 ± 2.8E-06	< -2.6E-06 ± 1.9E-05
		2	< 1.5E-05 ± 7.2E-05	< 5.4E-04 ± 6.1E-04	< 3.1E-06 ± 3.3E-06	< -5.1E-06 ± 2.0E-05
		3	1.2E-04 ± 1.0E-04	< 5.9E-04 ± 6.9E-04	< 2.3E-06 ± 4.6E-06	< -3.6E-06 ± 2.6E-05
		4	2.2E-04 ± 1.1E-04	< 5.5E-04 ± 6.4E-04	< 1.6E-08 ± 1.3E-06	< 3.5E-06 ± 2.1E-05
Average			1.4E-04 ± 9.7E-5	4.9E-04 ± 1.7E-4	1.2E-06 ± 2.2E-6	-2.0E-06 ± 4.9E-6

NOTE: Negative values indicate concentrations at or near background levels of radioactivity.

Table C-2. Air Sampling Results for 200 West for 1988 (pCi/m³). (Sheet 1 of 2)

Site	Location	Quarter	Sr-90 ± Error	Cs-137 ± Error	Pu-239 ± Error	U-Total ± Error
N153	241-TX Tank Farm	1	1.2E-04 ± 8.7E-05	1.5E-03 ± 8.3E-04	1.3E-05 ± 7.3E-06	< 5.9E-06 ± 2.0E-05
		2	1.2E-04 ± 1.1E-04	1.3E-03 ± 6.4E-04	5.0E-06 ± 3.8E-06	< -1.1E-05 ± 1.8E-05
		3	1.1E-04 ± 8.9E-05	2.0E-03 ± 8.1E-04	8.4E-06 ± 5.3E-06	< 9.1E-06 ± 2.3E-05
		4	2.1E-04 ± 1.3E-04	< 4.5E-04 ± 5.7E-04	4.3E-06 ± 3.3E-06	< 1.7E-05 ± 2.2E-05
Average			1.4E-04 ± 5.3E-5	1.3E-03 ± 6.6E-4	7.7E-06 ± 4.4E-6	5.5E-06 ± 1.2E-5
N155	241-U Tank Farm	1	1.3E-04 ± 9.0E-05	1.5E-03 ± 8.2E-04	1.7E-05 ± 7.0E-06	< 2.3E-05 ± 2.3E-05
		2	1.2E-04 ± 1.1E-04	< 4.6E-04 ± 5.2E-04	9.8E-06 ± 5.3E-06	< -2.7E-06 ± 1.9E-05
		3	< 7.4E-05 ± 7.5E-05	< 3.3E-04 ± 5.3E-04	2.4E-05 ± 9.9E-06	< 1.1E-05 ± 2.2E-05
		4	< 4.9E-05 ± 9.3E-05	< 3.6E-04 ± 6.1E-04	1.4E-05 ± 6.2E-06	< -3.1E-06 ± 1.8E-05
Average			9.3E-05 ± 4.0E-5	6.6E-04 ± 5.8E-4	1.6E-05 ± 6.2E-6	6.8E-06 ± 1.2E-5
N161	T Plant	1	8.6E-05 ± 8.2E-05	< -3.7E-04 ± 5.8E-04	2.8E-05 ± 9.4E-06	< 2.3E-07 ± 1.9E-05
		2	9.4E-05 ± 8.2E-05	< 0.0E+00 ± 5.9E-04	1.1E-05 ± 5.8E-06	< -1.0E-05 ± 1.8E-05
		3	< 6.4E-05 ± 9.2E-05	< 2.9E-05 ± 3.9E-04	2.0E-05 ± 8.1E-06	< -8.1E-07 ± 1.9E-05
		4	1.4E-04 ± 9.8E-05	< -2.5E-05 ± 5.9E-04	1.6E-05 ± 7.0E-06	< -6.9E-06 ± 1.8E-05
Average			9.6E-05 ± 3.3E-5	-9.1E-05 ± 2.1E-4	1.9E-05 ± 7.3E-6	-4.4E-06 ± 4.9E-6
N165	216-Z-19 Ditch (covered)	1	< 4.1E-05 ± 6.6E-05	< -6.2E-04 ± 5.7E-04	1.6E-04 ± 2.7E-05	< 1.4E-05 ± 2.1E-05
		2	< 5.5E-05 ± 7.3E-05	< -4.3E-04 ± 6.4E-04	4.2E-04 ± 5.8E-05	< -9.9E-06 ± 1.8E-05
		3	< 6.2E-05 ± 7.4E-05	< 5.7E-05 ± 5.0E-04	9.0E-04 ± 1.2E-04	< 1.9E-05 ± 2.5E-05
		4	< 6.2E-05 ± 7.3E-05	< 7.6E-05 ± 6.1E-04	2.0E-04 ± 2.9E-05	< -7.0E-07 ± 1.9E-05
Average			5.5E-05 ± 1.0E-5	-2.3E-04 ± 3.6E-4	4.2E-04 ± 3.4E-4	5.4E-06 ± 1.3E-5
N168	U Plant	1	1.2E-04 ± 9.1E-05	1.3E-03 ± 8.5E-04	2.2E-05 ± 7.6E-06	2.2E-04 ± 7.4E-05
		2	2.2E-04 ± 1.1E-04	1.1E-03 ± 5.7E-04	6.9E-06 ± 4.4E-06	1.2E-04 ± 4.8E-05
		3	1.1E-04 ± 8.5E-05	6.9E-04 ± 5.5E-04	6.1E-06 ± 5.1E-06	1.3E-04 ± 4.9E-05
		4	1.3E-04 ± 9.5E-05	< 1.7E-04 ± 5.2E-04	< 1.4E-06 ± 2.3E-06	< 2.0E-05 ± 2.2E-05
Average			1.4E-04 ± 5.3E-5	8.2E-04 ± 5.2E-4	9.2E-06 ± 9.4E-6	1.2E-04 ± 8.5E-5
N177	Laundry	1	< 7.7E-05 ± 7.9E-05	< -3.0E-05 ± 5.3E-04	1.8E-05 ± 7.7E-06	< 2.4E-05 ± 2.4E-05
		2	1.2E-04 ± 9.1E-05	< 1.0E-04 ± 5.8E-04	2.2E-05 ± 8.2E-06	2.9E-05 ± 2.5E-05
		3	1.2E-04 ± 9.1E-05	< 1.0E-04 ± 5.0E-04	1.1E-04 ± 2.0E-05	2.6E-05 ± 2.4E-05
		4	< 3.5E-05 ± 7.0E-05	< 9.0E-05 ± 4.9E-04	1.1E-05 ± 5.8E-06	2.6E-05 ± 2.3E-05
Average			8.9E-05 ± 4.3E-5	6.7E-05 ± 7.6E-5	4.0E-05 ± 4.7E-5	2.6E-05 ± 2.2E-6
N956	E of 241-S and -SX Tank Farm	1	2.3E-04 ± 1.2E-04	1.1E-03 ± 6.1E-04	9.5E-06 ± 4.8E-06	< -2.0E-06 ± 1.9E-05
		2	< 6.8E-06 ± 6.3E-05	< 5.5E-04 ± 6.4E-04	< 9.3E-07 ± 2.5E-06	< -1.1E-05 ± 1.8E-05
		3	9.7E-05 ± 8.7E-05	< 7.0E-04 ± 8.1E-04	1.2E-05 ± 6.2E-06	< -2.8E-06 ± 1.9E-05
		4	< 3.8E-05 ± 7.1E-05	< -1.9E-04 ± 5.4E-04	5.2E-06 ± 3.7E-06	< -1.3E-05 ± 1.8E-05
Average			9.3E-05 ± 1.0E-4	5.4E-04 ± 5.5E-4	6.9E-06 ± 5.2E-6	-7.3E-06 ± 5.8E-6
N960	Replicate to site N155	1	8.1E-05 ± 8.0E-05	< 4.8E-04 ± 7.3E-04	3.8E-05 ± 1.1E-05	3.6E-05 ± 2.6E-05
		2	< 3.6E-05 ± 9.8E-05	< 2.3E-04 ± 6.2E-04	6.7E-06 ± 4.7E-06	< -1.2E-06 ± 1.9E-05
		3	< 4.3E-05 ± 9.1E-05	< 2.9E-04 ± 5.5E-04	1.5E-05 ± 5.7E-06	< -5.5E-07 ± 1.9E-05
		4	< 4.3E-05 ± 1.1E-04	< 2.4E-04 ± 5.9E-04	2.2E-05 ± 1.2E-05	< -1.2E-06 ± 1.9E-05
Average			5.0E-05 ± 2.3E-5	3.1E-04 ± 1.4E-4	2.1E-05 ± 1.4E-5	8.2E-06 ± 1.9E-5
N962	SE corner of W-4B	1	2.9E-04 ± 1.5E-04	7.0E-04 ± 5.8E-04	1.7E-05 ± 8.6E-06	< 2.2E-06 ± 2.6E-05
		2	4.6E-04 ± 1.8E-04	8.2E-04 ± 7.2E-04	2.7E-05 ± 1.1E-05	< 4.0E-06 ± 2.0E-05
		3	2.2E-04 ± 1.2E-04	< -1.5E-04 ± 5.8E-04	4.5E-05 ± 1.1E-05	< 1.4E-05 ± 2.1E-05
		4	2.8E-04 ± 1.8E-04	< 3.4E-04 ± 5.9E-04	8.1E-06 ± 5.3E-06	< -6.4E-06 ± 2.3E-05
Average			3.1E-04 ± 1.0E-4	4.3E-04 ± 4.4E-4	2.4E-05 ± 1.6E-5	3.4E-06 ± 8.6E-6
N963	SE of REDOX	1	9.9E-05 ± 8.5E-05	< 5.0E-05 ± 4.4E-04	5.2E-05 ± 1.4E-05	< -4.6E-06 ± 1.8E-05
		2	< 3.1E-05 ± 8.3E-05	< 0.0E+00 ± 5.0E-04	6.7E-06 ± 5.2E-06	< -3.0E-06 ± 1.9E-05
		3	1.1E-04 ± 8.3E-05	6.6E-04 ± 5.8E-04	3.3E-06 ± 2.8E-06	< 1.8E-06 ± 2.1E-05
		4	1.8E-04 ± 1.3E-04	< -3.0E-04 ± 5.7E-04	< 1.0E-06 ± 1.9E-06	< -1.9E-06 ± 2.0E-05
Average			1.1E-04 ± 6.4E-5	1.0E-04 ± 4.1E-4	1.6E-05 ± 2.5E-5	-1.9E-06 ± 2.9E-6
N964	W of W-4B	1	< 3.3E-05 ± 6.8E-05	< -1.0E-04 ± 4.6E-04	1.8E-05 ± 7.4E-06	< -6.6E-06 ± 1.8E-05
		2	< 2.9E-05 ± 6.5E-05	< 1.7E-04 ± 5.5E-04	< -5.7E-07 ± 4.0E-06	< -5.2E-06 ± 1.9E-05
		3	1.6E-04 ± 9.7E-05	< 8.3E-05 ± 3.7E-04	4.3E-06 ± 3.1E-06	< -3.8E-06 ± 1.9E-05
		4	1.2E-04 ± 8.8E-05	< -3.0E-04 ± 5.3E-04	2.9E-06 ± 2.9E-06	< -7.9E-06 ± 1.9E-05
Average			8.4E-05 ± 6.6E-5	-3.9E-05 ± 2.2E-4	6.2E-06 ± 8.5E-6	-5.9E-06 ± 1.8E-6
N965	NE Corner of 200 West Area	1	< 4.6E-05 ± 7.4E-05	< -3.3E-04 ± 6.2E-04	< 4.4E-06 ± 4.8E-06	< 6.2E-06 ± 2.0E-05
		2	< 1.8E-05 ± 6.2E-05	< 1.5E-04 ± 5.9E-04	< 3.8E-06 ± 5.3E-06	< 1.3E-06 ± 2.0E-05
		3	< 6.1E-05 ± 7.9E-05	< 2.6E-04 ± 4.6E-04	< 2.5E-06 ± 3.3E-06	< 5.9E-06 ± 2.0E-05
		4	1.1E-04 ± 1.0E-04	< 3.4E-04 ± 5.7E-04	< 1.9E-06 ± 2.3E-06	< -1.3E-05 ± 1.8E-05
Average			5.7E-05 ± 4.0E-5	1.1E-04 ± 3.1E-4	3.2E-06 ± 1.8E-6	2.0E-07 ± 8.9E-6
N966	S of 200 West Area Main Gate	1	< 5.3E-05 ± 7.6E-05	< -3.0E-04 ± 4.6E-04	6.9E-06 ± 4.6E-06	< 1.8E-05 ± 2.2E-05
		2	< 4.7E-05 ± 7.2E-05	< 2.3E-04 ± 4.6E-04	4.7E-06 ± 4.5E-06	< 4.2E-06 ± 2.0E-05
		3	1.5E-04 ± 9.1E-05	< 2.6E-04 ± 4.2E-04	4.7E-06 ± 3.2E-06	< -7.8E-06 ± 1.8E-05
		4	2.1E-04 ± 1.2E-04	< -6.5E-04 ± 6.3E-04	< 5.7E-07 ± 2.3E-06	< -1.1E-05 ± 1.8E-05
Average			1.1E-04 ± 8.0E-5	-1.1E-04 ± 4.5E-4	4.2E-06 ± 2.9E-6	7.9E-07 ± 1.3E-5
N974	N of T Plant	1	< 2.6E-05 ± 6.6E-05	< -2.3E-04 ± 5.6E-04	< 1.9E-06 ± 2.5E-06	< 2.2E-06 ± 1.9E-05
		2	< 3.3E-05 ± 8.4E-05	< -6.8E-05 ± 7.3E-04	< 2.7E-06 ± 3.7E-06	< 4.6E-07 ± 2.0E-05
		3	2.4E-04 ± 1.2E-04	< 2.5E-05 ± 4.7E-04	< -4.0E-09 ± 2.0E-06	< -9.4E-06 ± 1.9E-05
		4	1.6E-04 ± 1.1E-04	< -1.4E-04 ± 4.1E-04	< 2.7E-06 ± 2.7E-06	< 2.9E-06 ± 2.0E-05
Average			1.1E-04 ± 1.1E-4	-1.0E-04 ± 1.7E-4	1.8E-06 ± 1.5E-6	-9.7E-07 ± 5.7E-6

Table C-2. Air Sampling Results for 200 West for 1988 (pCi/m³). (Sheet 2 of 2)

Site	Location	Quarter	Sr-90 ± Error	Cs-137 ± Error	Pu-239 ± Error	U-Total ± Error
N975	E of Z Plant	1	1.1E-04 ± 8.3E-05	4.8E-04 ± 3.8E-04	5.5E-05 ± 1.3E-05	5.5E-05 ± 3.1E-05
		2	< 6.9E-05 ± 1.0E-04	< 1.0E-04 ± 4.6E-04	7.8E-06 ± 5.7E-06	< -3.9E-06 ± 1.9E-05
		3	1.3E-04 ± 1.1E-04	< 4.2E-04 ± 4.5E-04	1.7E-05 ± 6.9E-06	< -6.7E-06 ± 1.8E-05
		4	1.6E-04 ± 1.1E-04	< -3.6E-04 ± 5.6E-04	1.9E-05 ± 6.7E-06	< -1.1E-05 ± 1.8E-05
Average			1.2E-04 ± 4.1E-5	1.6E-04 ± 3.9E-4	2.5E-05 ± 2.1E-5	8.4E-06 ± 3.2E-5
N986	241-TY Tank Farm SE	1	9.9E-05 ± 8.8E-05	< 1.8E-04 ± 4.0E-04	8.3E-06 ± 5.1E-06	< 2.6E-06 ± 1.9E-05
		2	< 2.3E-05 ± 6.8E-05	< 3.0E-04 ± 4.8E-04	7.4E-06 ± 6.0E-06	< -8.4E-06 ± 1.9E-05
		3	1.4E-04 ± 1.0E-04	6.8E-04 ± 6.4E-04	3.5E-05 ± 1.1E-05	< -1.3E-05 ± 2.1E-05
		4	1.2E-04 ± 8.8E-05	6.6E-04 ± 5.9E-04	< 2.6E-06 ± 2.6E-06	< -7.8E-06 ± 1.8E-05
Average			9.5E-05 ± 5.3E-5	4.5E-04 ± 2.7E-4	1.3E-05 ± 1.5E-5	-6.8E-06 ± 6.8E-6
N987	241-TY Tank Farm NE	1	< 6.9E-05 ± 8.4E-05	< 1.8E-04 ± 6.2E-04	1.7E-05 ± 6.6E-06	< 9.7E-06 ± 2.0E-05
		2	1.2E-04 ± 9.3E-05	< 9.1E-05 ± 4.9E-04	< 1.9E-06 ± 3.1E-06	< -5.9E-06 ± 1.9E-05
		3	1.3E-04 ± 8.8E-05	< 5.7E-05 ± 5.7E-04	5.4E-06 ± 4.2E-06	< 4.8E-06 ± 2.0E-05
		4	1.9E-04 ± 1.2E-04	< 4.2E-04 ± 4.4E-04	4.6E-06 ± 3.8E-06	< -5.6E-06 ± 1.8E-05
Average			1.3E-04 ± 5.2E-5	1.9E-04 ± 1.8E-4	7.3E-06 ± 7.1E-6	7.4E-07 ± 7.8E-6
N994	Old NW Corner 200 West	1	< 1.7E-05 ± 9.3E-05	< 1.6E-04 ± 4.9E-04	< 2.2E-06 ± 2.8E-06	2.6E-05 ± 2.4E-05
		2	< 3.6E-05 ± 1.1E-04	6.1E-04 ± 5.7E-04	< -1.4E-06 ± 1.0E-06	1.3E-04 ± 5.0E-05
		3	2.3E-04 ± 1.2E-04	< 2.4E-04 ± 5.7E-04	< -5.6E-07 ± 2.0E-06	2.9E-05 ± 2.6E-05
		4	< 6.3E-05 ± 7.1E-05	< 2.4E-04 ± 4.8E-04	< 2.6E-06 ± 2.6E-06	< 5.8E-07 ± 1.9E-05
Average			8.6E-05 ± 9.8E-5	3.1E-04 ± 2.1E-4	7.0E-07 ± 2.1E-6	4.6E-05 ± 5.9E-5

NOTE: Negative values indicate concentrations at or near background levels of radioactivity.

Table C-3. Air Sampling Results for Background Stations for 1988 (pCi/m3).

Site	Location	Quarter	Sr-90 ± Error	Cs-137 ± Error	Pu-239 ± Error	U-Total ± Error
N961	Yakima Barricade	1	< -4.8E-06 ± 6.4E-05	< 0.0E+00 ± 3.9E-04	< 1.4E-06 ± 2.2E-06	< -9.1E-06 ± 1.8E-05
		2	< 2.1E-05 ± 8.7E-05	< -4.6E-04 ± 6.1E-04	< 4.3E-07 ± 2.0E-06	< -6.4E-06 ± 1.9E-05
		3	1.7E-04 ± 1.1E-04	6.4E-04 ± 3.9E-04	5.3E-06 ± 3.9E-06	< -1.1E-05 ± 1.8E-05
		4	1.5E-04 ± 1.3E-04	< -2.8E-04 ± 5.7E-04	1.9E-05 ± 7.5E-06	< -8.7E-06 ± 1.8E-05
Average			8.3E-05 ± 9.3E-5	-2.8E-05 ± 5.0E-4	6.6E-06 ± 9.1E-6	-8.7E-06 ± 1.8E-6
N981	Wye Barricade	1	1.2E-04 ± 9.8E-05	< 2.8E-05 ± 5.3E-04	< 4.7E-07 ± 2.1E-06	< -7.0E-06 ± 1.8E-05
		2	< 3.4E-05 ± 6.5E-05	< -1.2E-04 ± 4.3E-04	< 2.1E-06 ± 2.7E-06	< -1.1E-05 ± 1.8E-05
		3	8.8E-05 ± 8.0E-05	< -1.3E-04 ± 5.0E-04	< -2.4E-08 ± 2.4E-06	< -7.1E-06 ± 1.9E-05
		4	1.2E-04 ± 8.4E-05	< -1.1E-04 ± 5.7E-04	< 1.1E-06 ± 1.9E-06	< 2.4E-06 ± 1.9E-05
Average			9.0E-05 ± 4.2E-5	-8.0E-05 ± 9.3E-5	9.1E-07 ± 1.0E-6	-5.7E-06 ± 5.8E-6
N982	Hanford Townsite	1	8.7E-05 ± 8.3E-05	< 3.3E-04 ± 4.0E-04	< 7.5E-07 ± 1.9E-06	< -1.2E-05 ± 1.7E-05
		2	< 4.6E-05 ± 6.9E-05	< 2.2E-04 ± 5.1E-04	2.2E-05 ± 1.0E-05	< -1.4E-05 ± 1.8E-05
		3	1.5E-04 ± 1.0E-04	7.6E-04 ± 5.0E-04	< -5.3E-08 ± 2.3E-06	< 3.9E-06 ± 2.1E-05
		4	1.2E-04 ± 8.8E-05	< 2.6E-04 ± 4.2E-04	< 2.1E-08 ± 2.0E-06	< -8.6E-06 ± 1.8E-05
Average			1.0E-04 ± 4.6E-5	3.9E-04 ± 2.6E-4	5.7E-06 ± 1.2E-5	-7.7E-06 ± 8.2E-6
N950	Quality Assurance Blank	1	< -2.5E-05 ± 6.4E-05	< 3.7E-04 ± 4.3E-04	1.7E-05 ± 6.9E-06	< -1.5E-05 ± 1.7E-05
		2	< 6.3E-05 ± 7.3E-05	< -2.6E-05 ± 5.3E-04	1.6E-05 ± 7.2E-06	< -2.1E-05 ± 1.7E-05
		3	< -1.8E-05 ± 6.1E-05	4.6E-04 ± 3.3E-04	< 1.4E-06 ± 2.3E-06	< -1.7E-05 ± 1.7E-05
		4	< 3.8E-05 ± 6.7E-05	< -2.4E-04 ± 4.5E-04	5.3E-06 ± 3.9E-06	< -1.7E-05 ± 1.7E-05
Average			1.4E-05 ± 4.3E-5	1.4E-04 ± 3.4E-4	1.0E-05 ± 8.2E-6	-1.7E-05 ± 2.8E-6
N951	Quality Assurance Blank	1	< -1.4E-05 ± 7.0E-05	< -1.3E-04 ± 3.0E-04	< 1.9E-06 ± 2.7E-06	< -1.4E-05 ± 1.7E-05
		2	< 1.4E-05 ± 6.5E-05	< -2.1E-04 ± 5.9E-04	< -5.7E-07 ± 2.1E-06	< -2.4E-05 ± 1.7E-05
		3	< 6.1E-05 ± 1.0E-04	< -9.0E-05 ± 5.3E-04	1.1E-05 ± 5.7E-06	< -2.1E-05 ± 1.9E-05
		4	< 4.2E-05 ± 1.0E-04	< -3.2E-04 ± 3.5E-04	< -1.2E-06 ± 1.3E-06	< -1.8E-05 ± 1.7E-05
Average			2.6E-05 ± 3.8E-5	-1.9E-04 ± 1.7E-4	2.7E-06 ± 5.9E-6	-1.9E-05 ± 4.2E-6

NOTE: Negative values indicate concentrations at or near background levels of radioactivity.

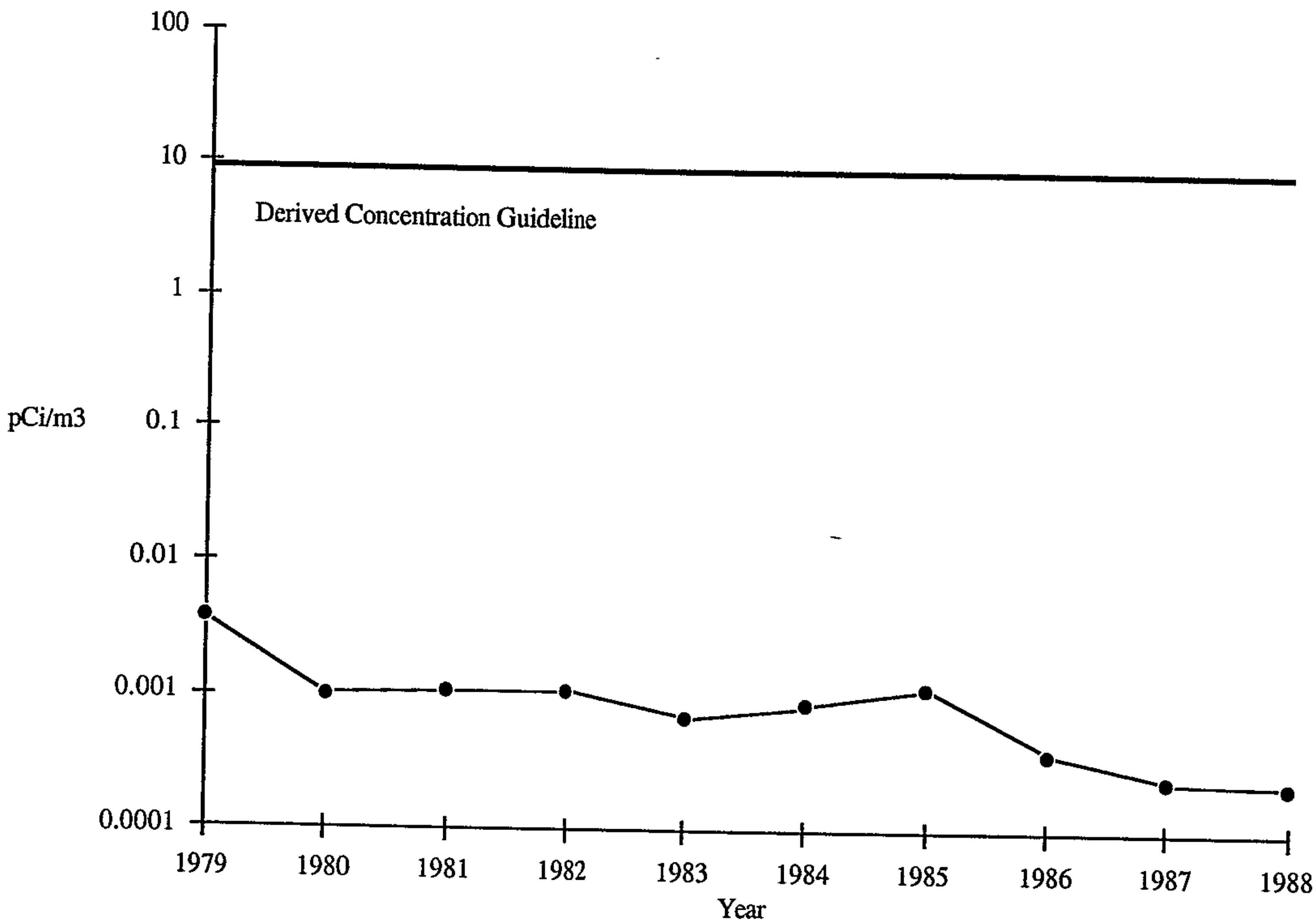

Figure C-4. The Strontium-90 in Air, 200 East Area.

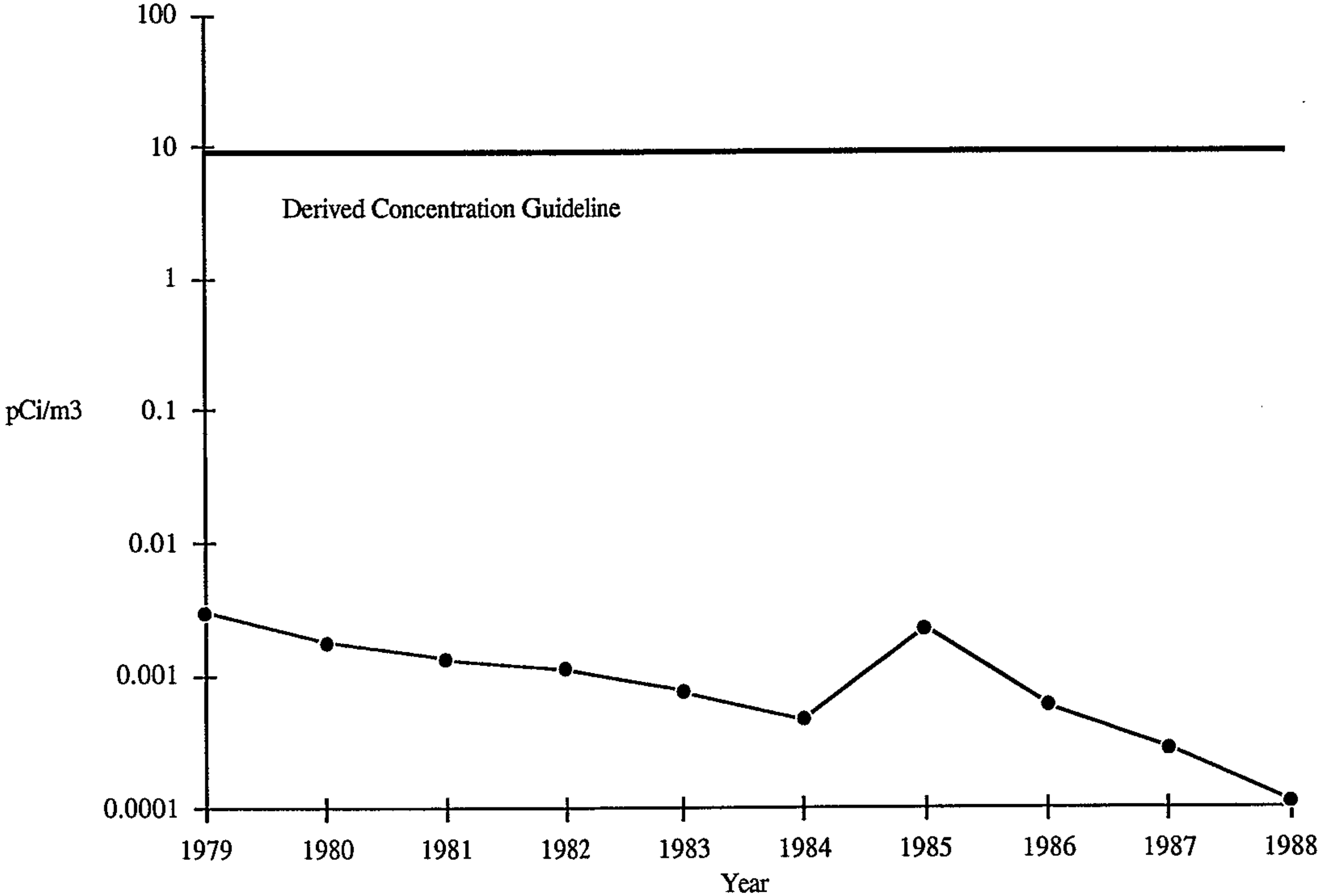

Figure C-5. The Strontium-90 in Air, 200 West Area.

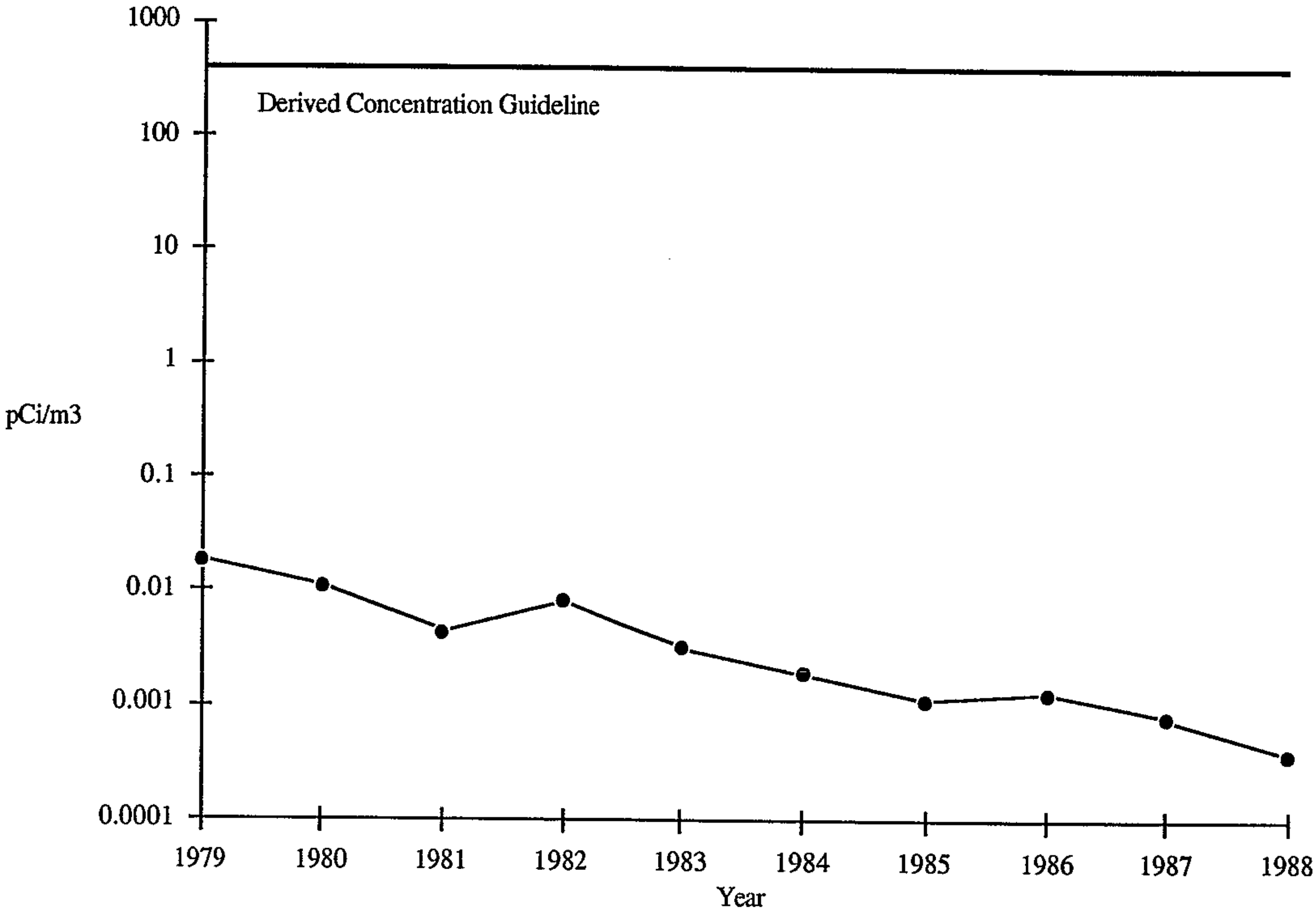

Figure C-6. The Cesium-137 in Air, 200 East Area.

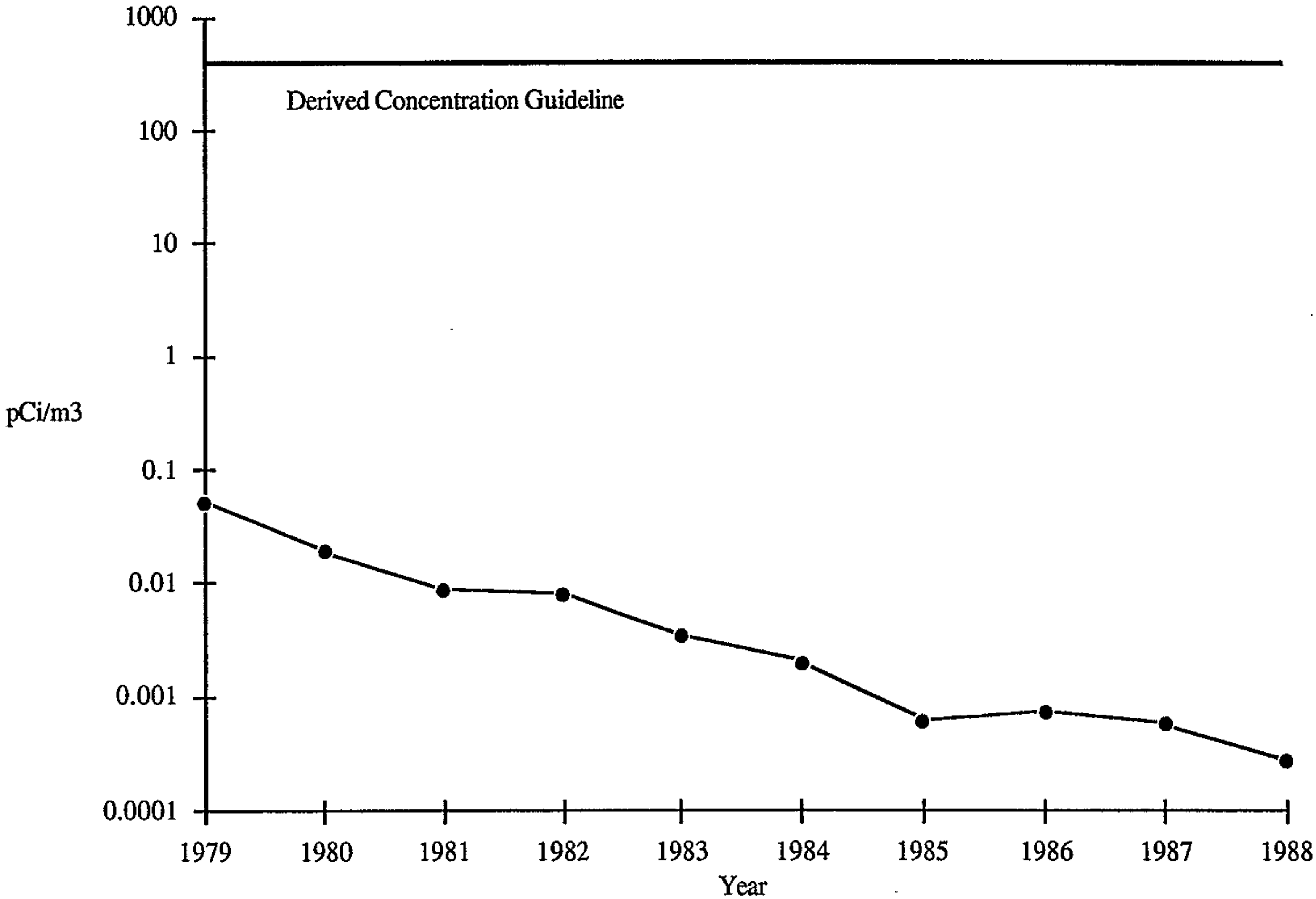

Figure C-7. The Cesium-137 in Air, 200 West Area.

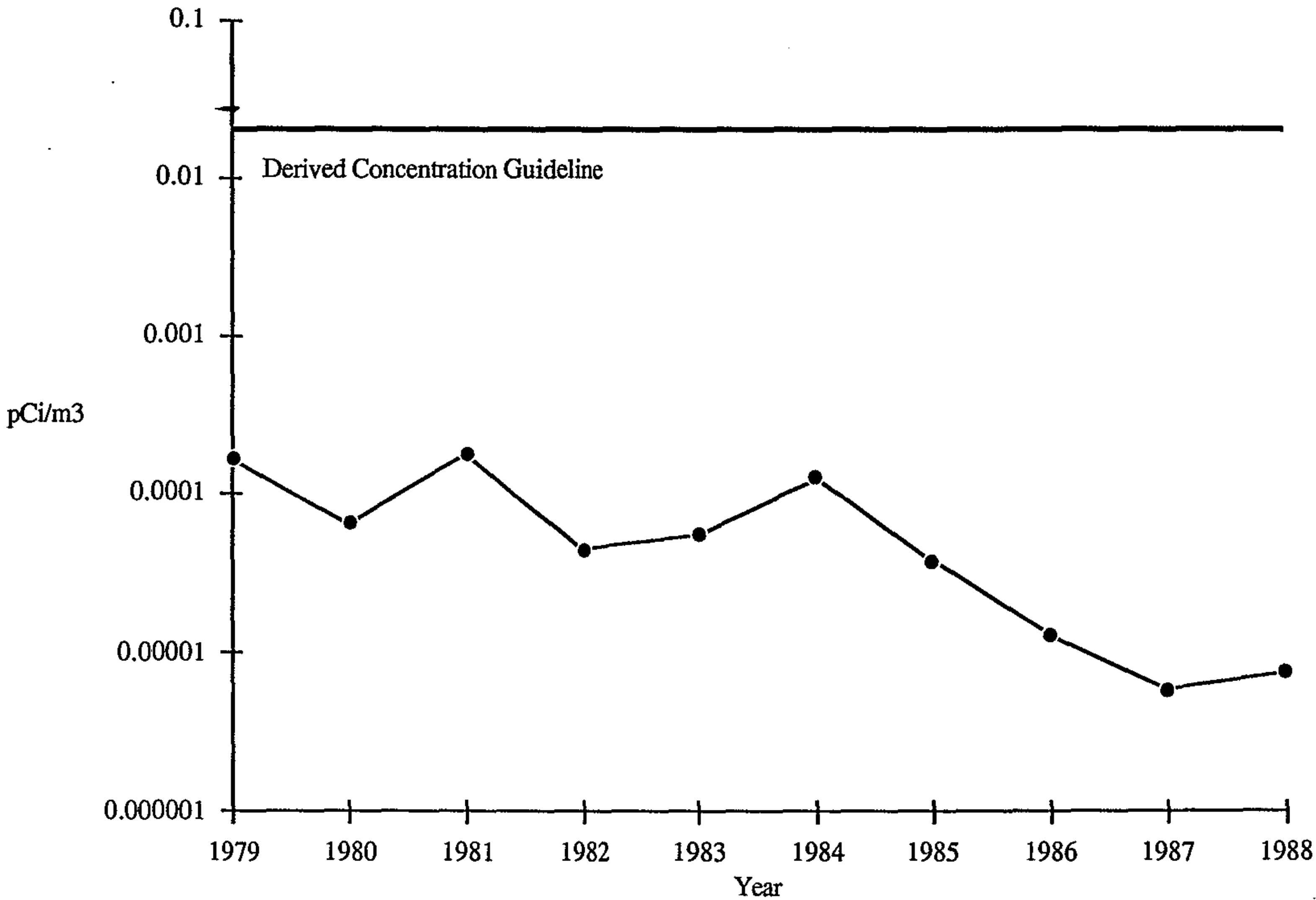

Figure C-8. The Plutonium-239 in Air, 200 East Area.

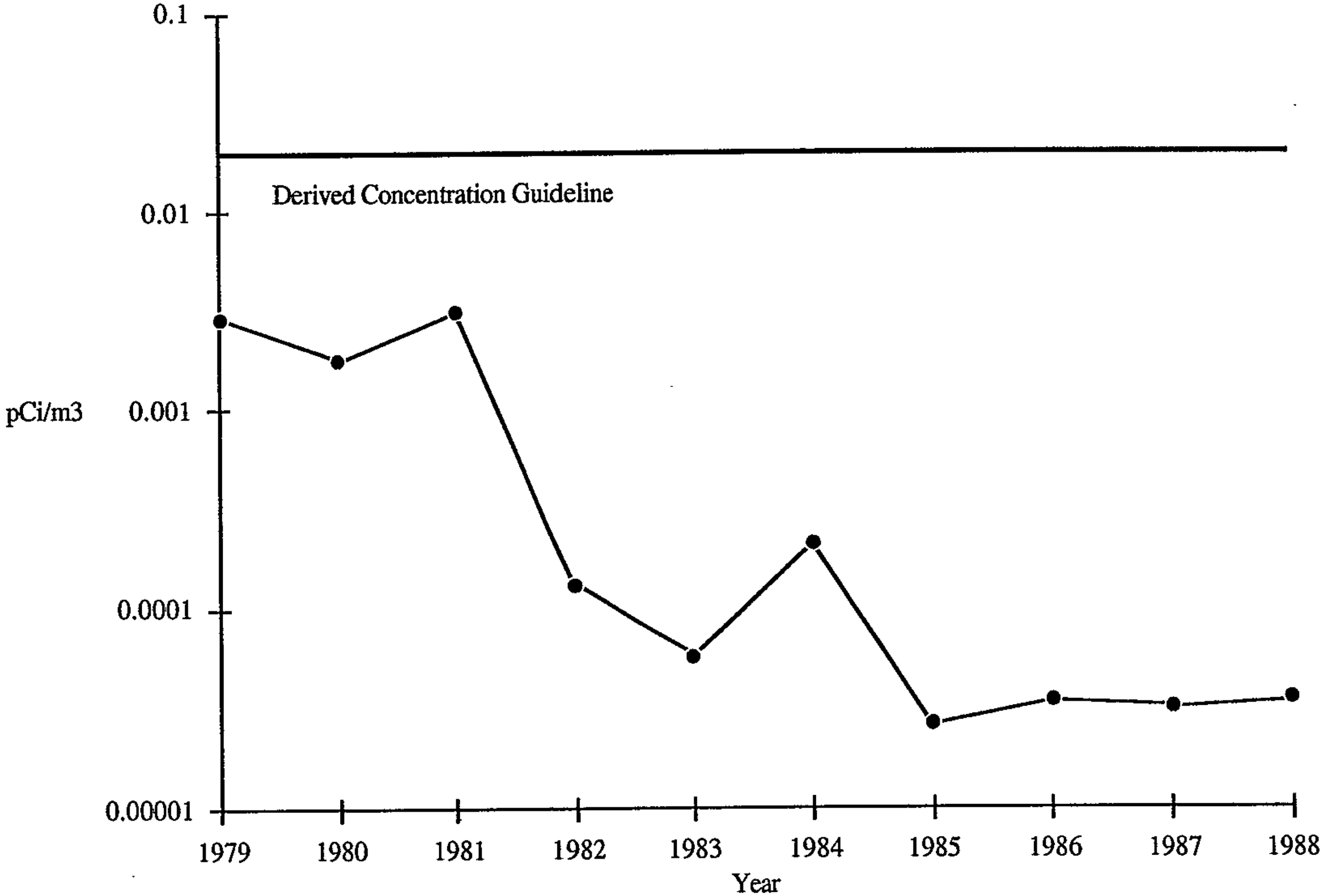

Figure C-9. The Plutonium-239 in Air, 200 West Area.

Table C-4. Annual Average Gaseous vs. Particulate Ruthenium-106 in Air (pCi/m^3).

Site	Location	Gaseous ± Error (a)	Particulate ± Error (b)
N006	N of AP Tank Farm	0.27 ± 0.49	0.011 ± 0.006
N007	S of AP Tank Farm	0.14 ± 0.12	0.012 ± 0.009
N008	E of AP Tank Farm	0.30 ± 0.64	0.020 ± 0.008
N012	NE of 207-A Retention Basin	0.34 ± 0.76	0.018 ± 0.009
N997	E Air Intake 272-AW	0.24 ± 0.49	0.016 ± 0.013

(a) Error represents 2 * Standard Deviation.

(b) Error represents 2 * Standard Error of the Mean.

APPENDIX D

GROUNDWATER MONITORING FIGURES AND TABLES

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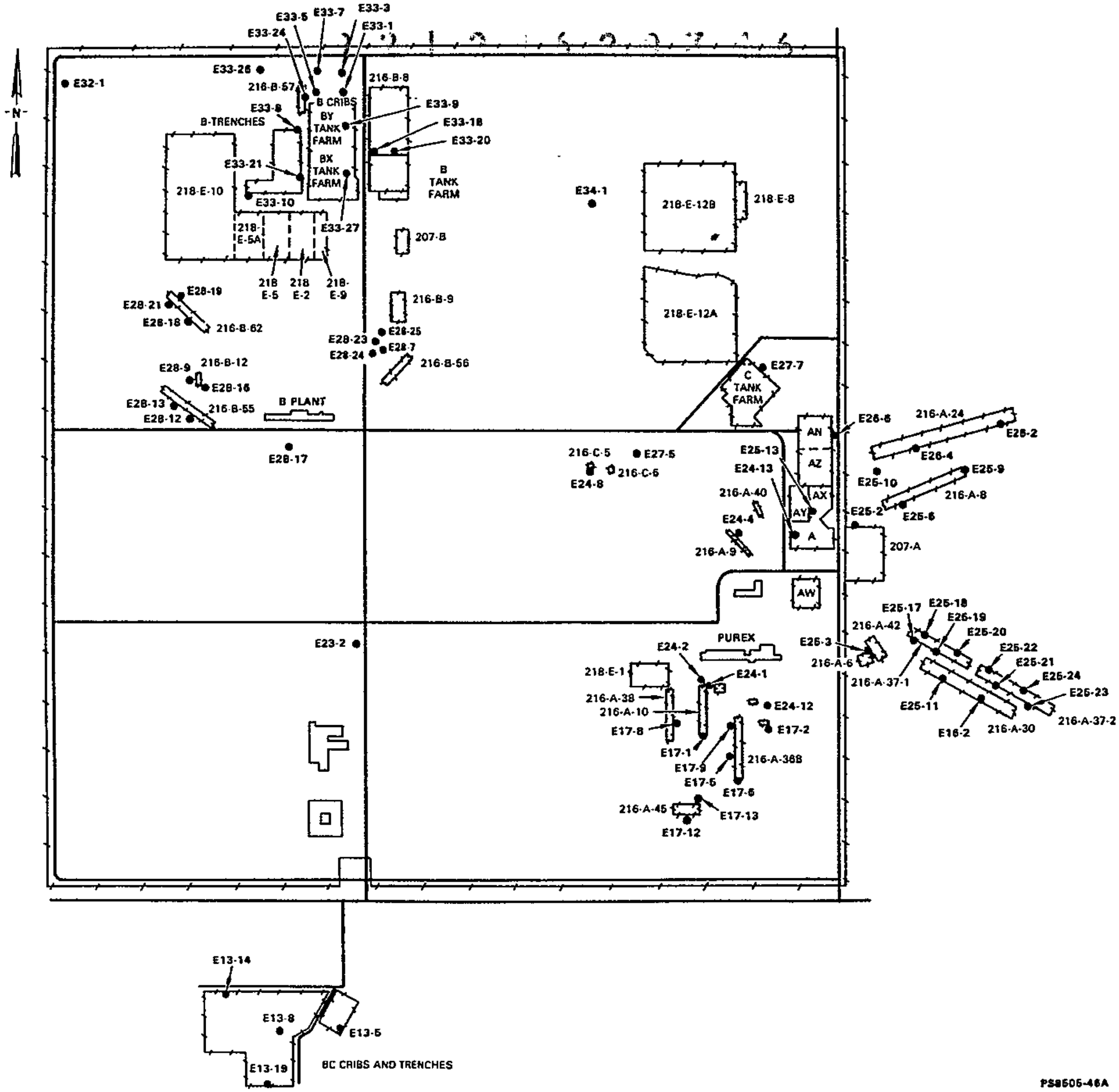

Figure D-1. Groundwater Monitoring Wells in the 200 East Area.

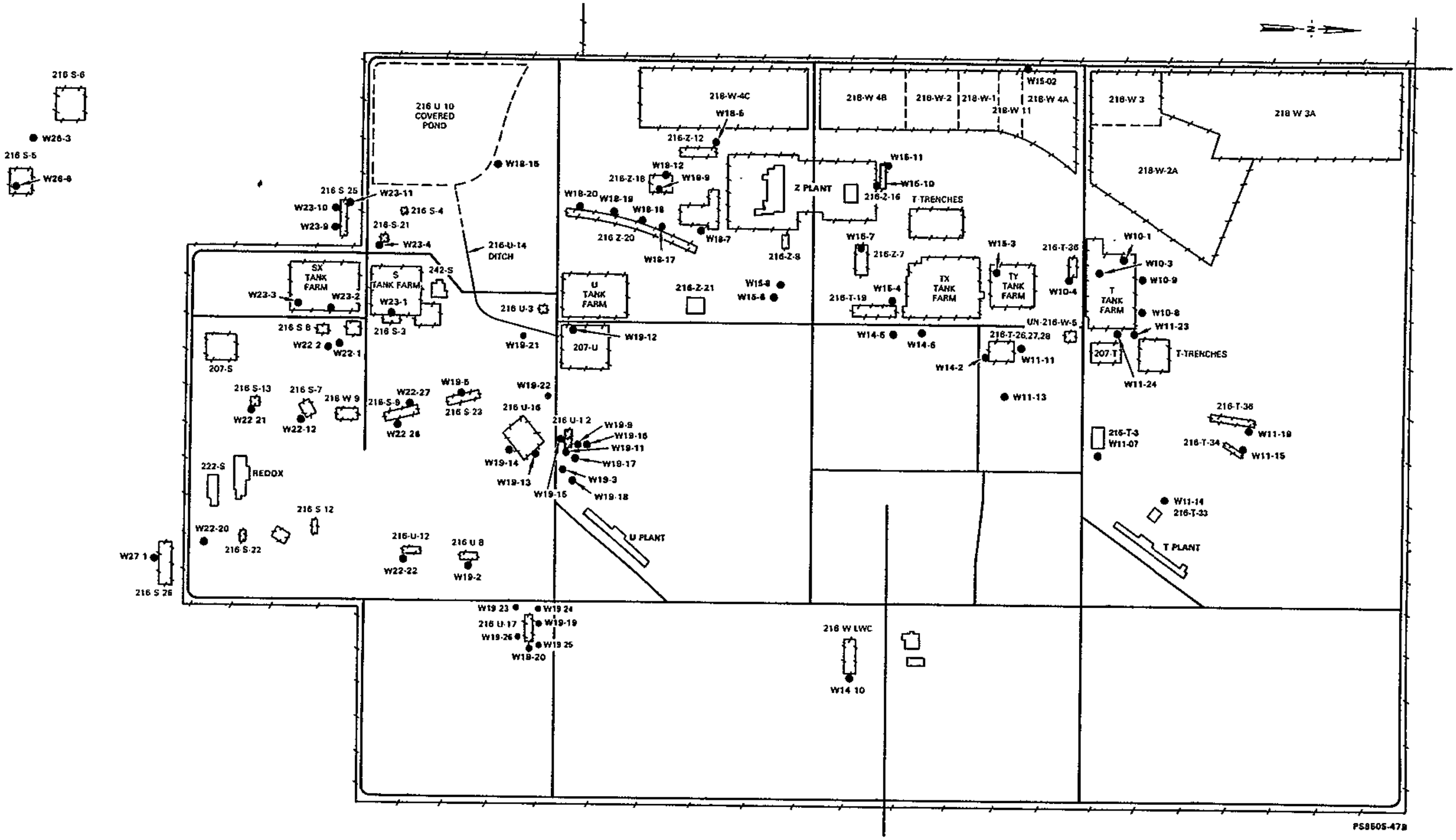

Figure D-2. Groundwater Monitoring Wells in the 200 West Area.

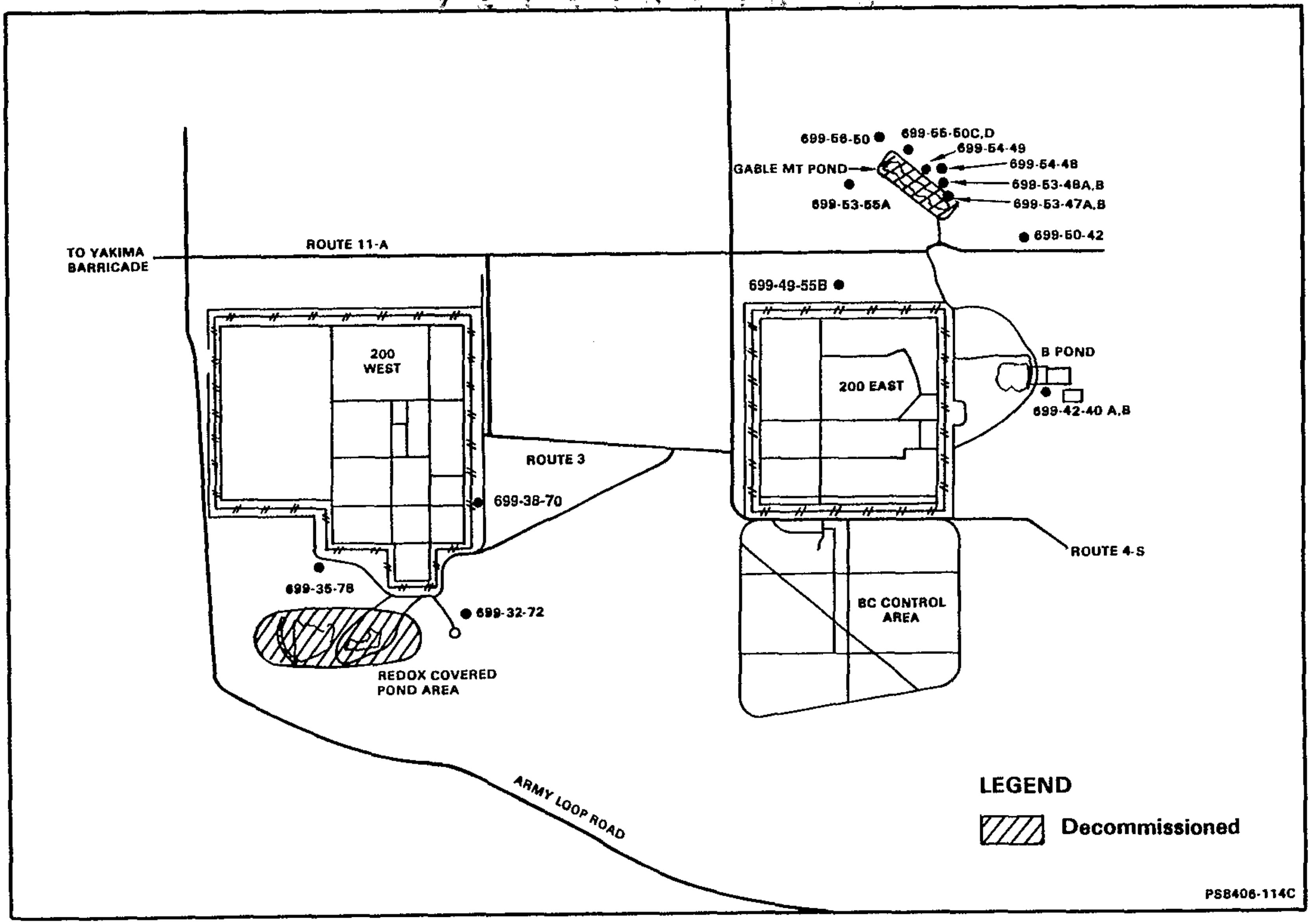

Figure D-3. Location of the 600 Area Monitoring Wells Used in the Separations Area Groundwater Monitoring Program.

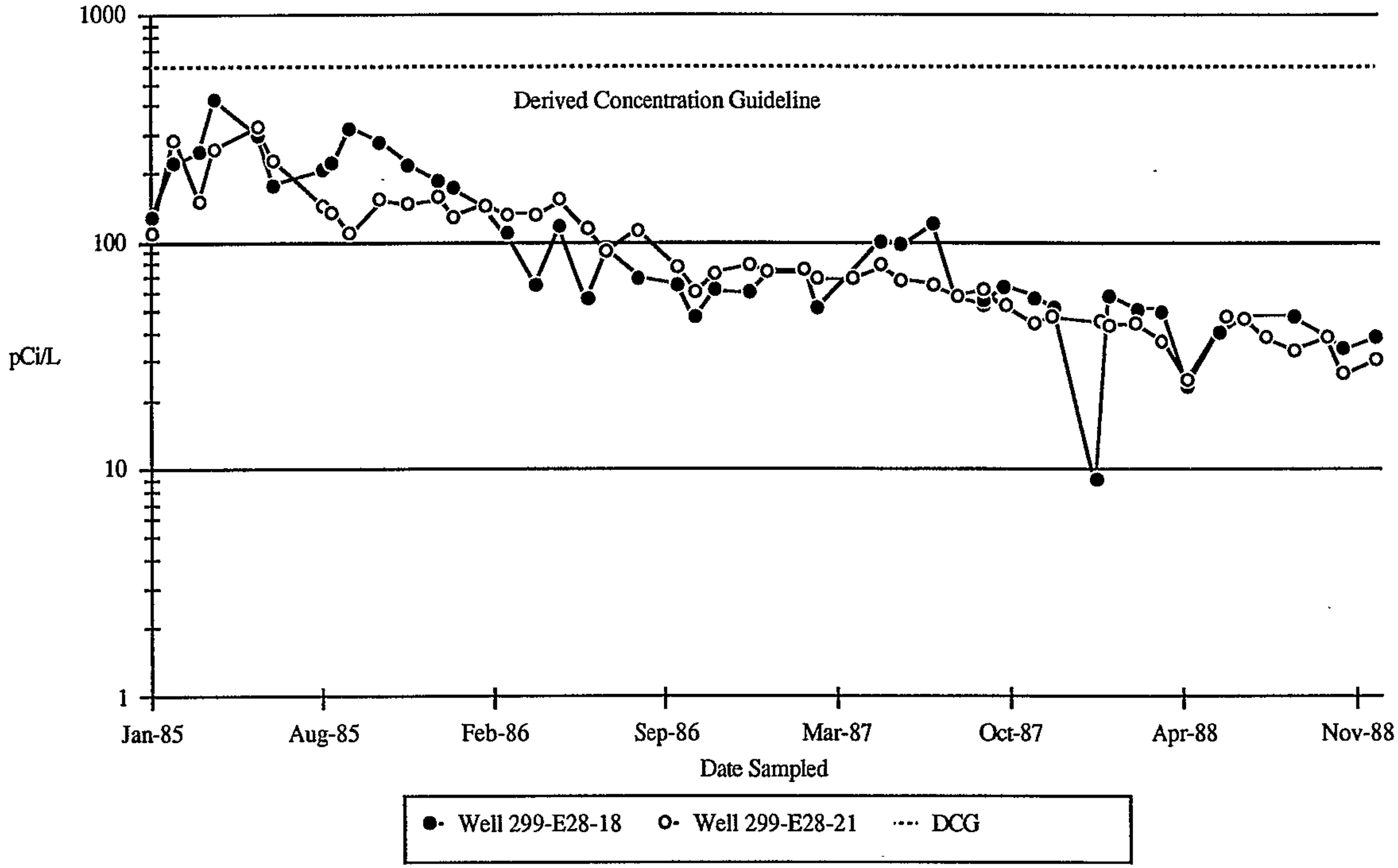

Figure D-4. Total Uranium in Groundwater at the 216-B-62 Crib.

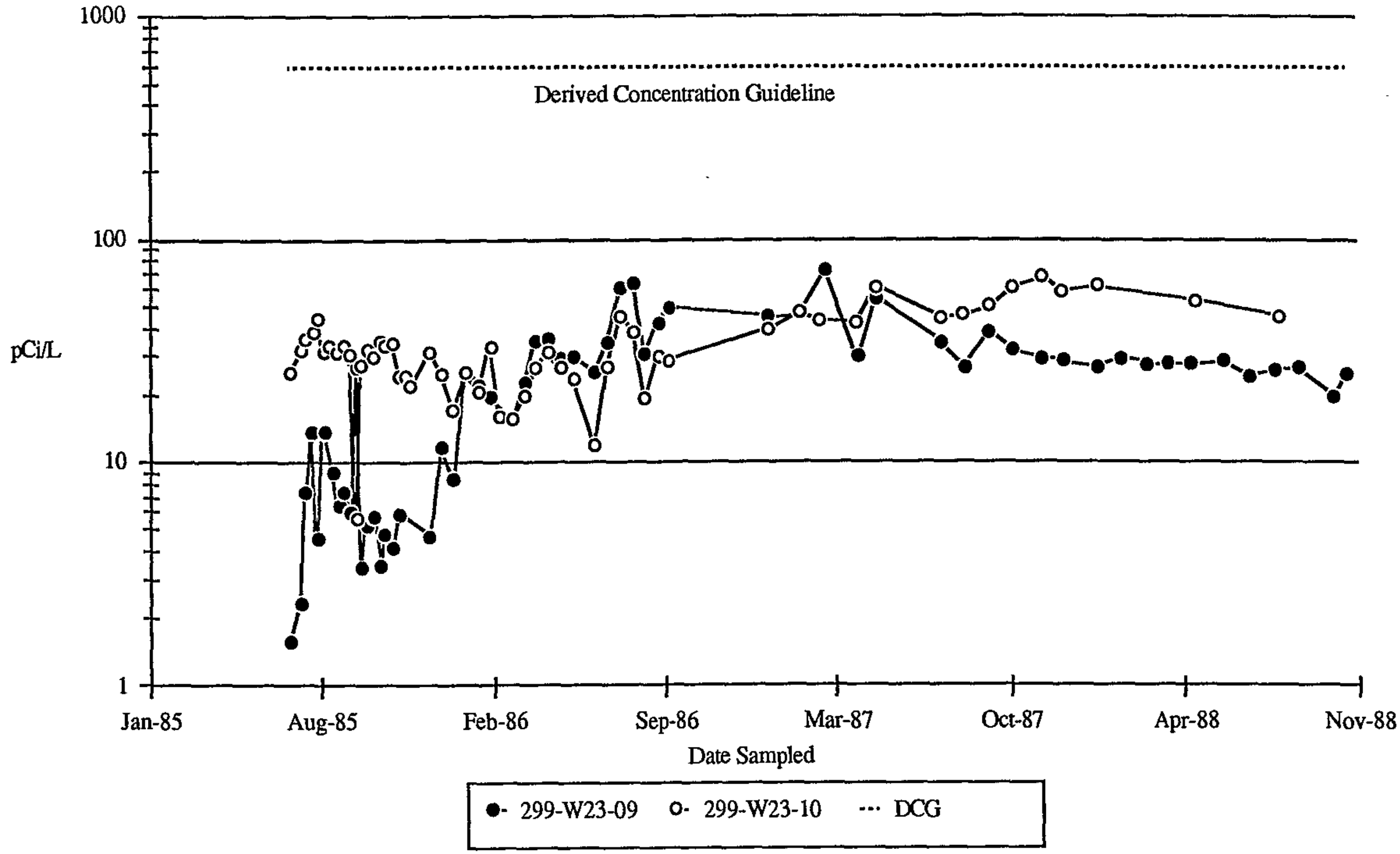

Figure D-5. Total Uranium in Groundwater at the 216-S-25 Crib.

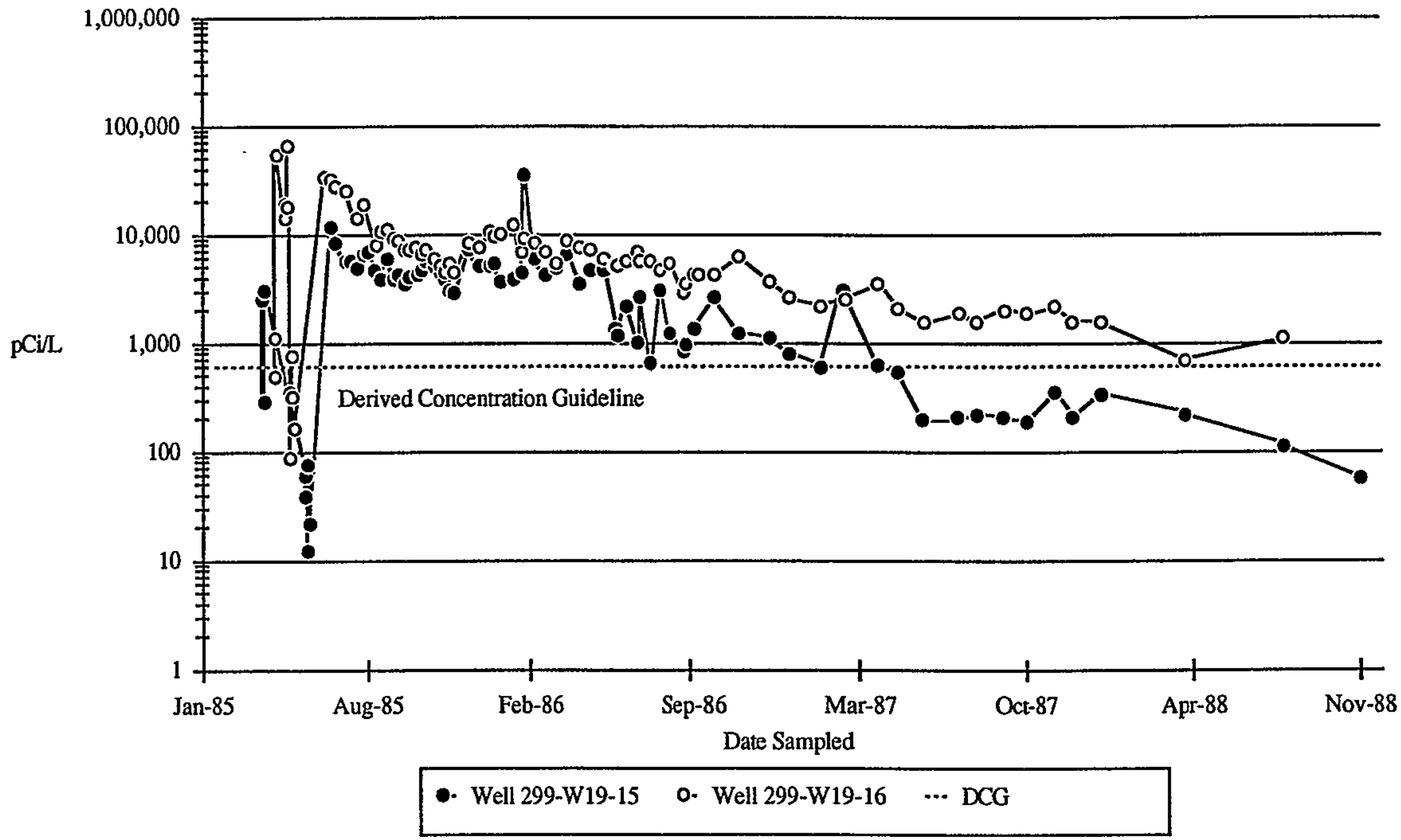

Figure D-6. Total Uranium in Groundwater Upgradient of the 216-U-1, 2 Cribs.

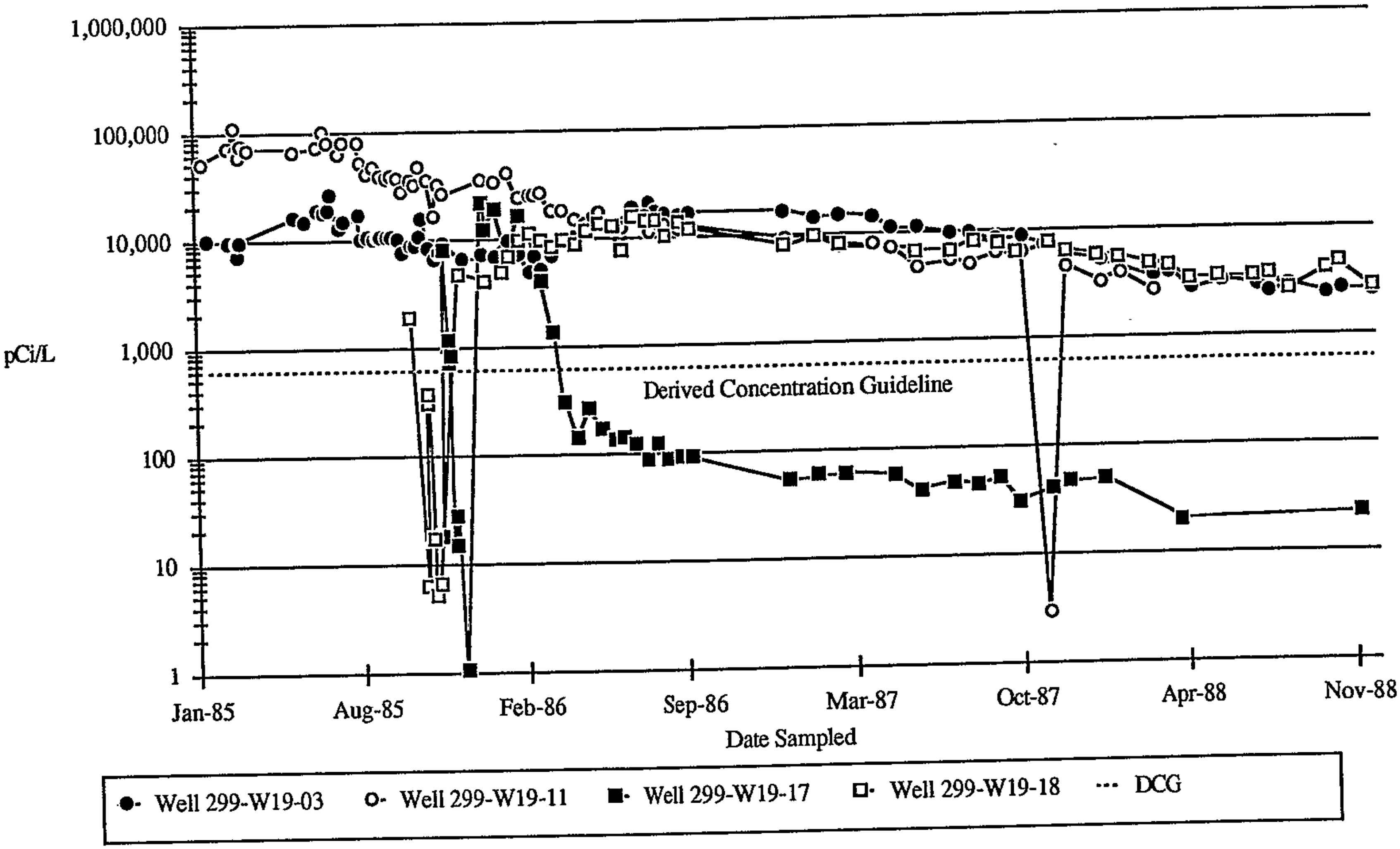

Figure D-7. Total Uranium in Groundwater Downgradient of the 216-U-1, 2 Cribs.

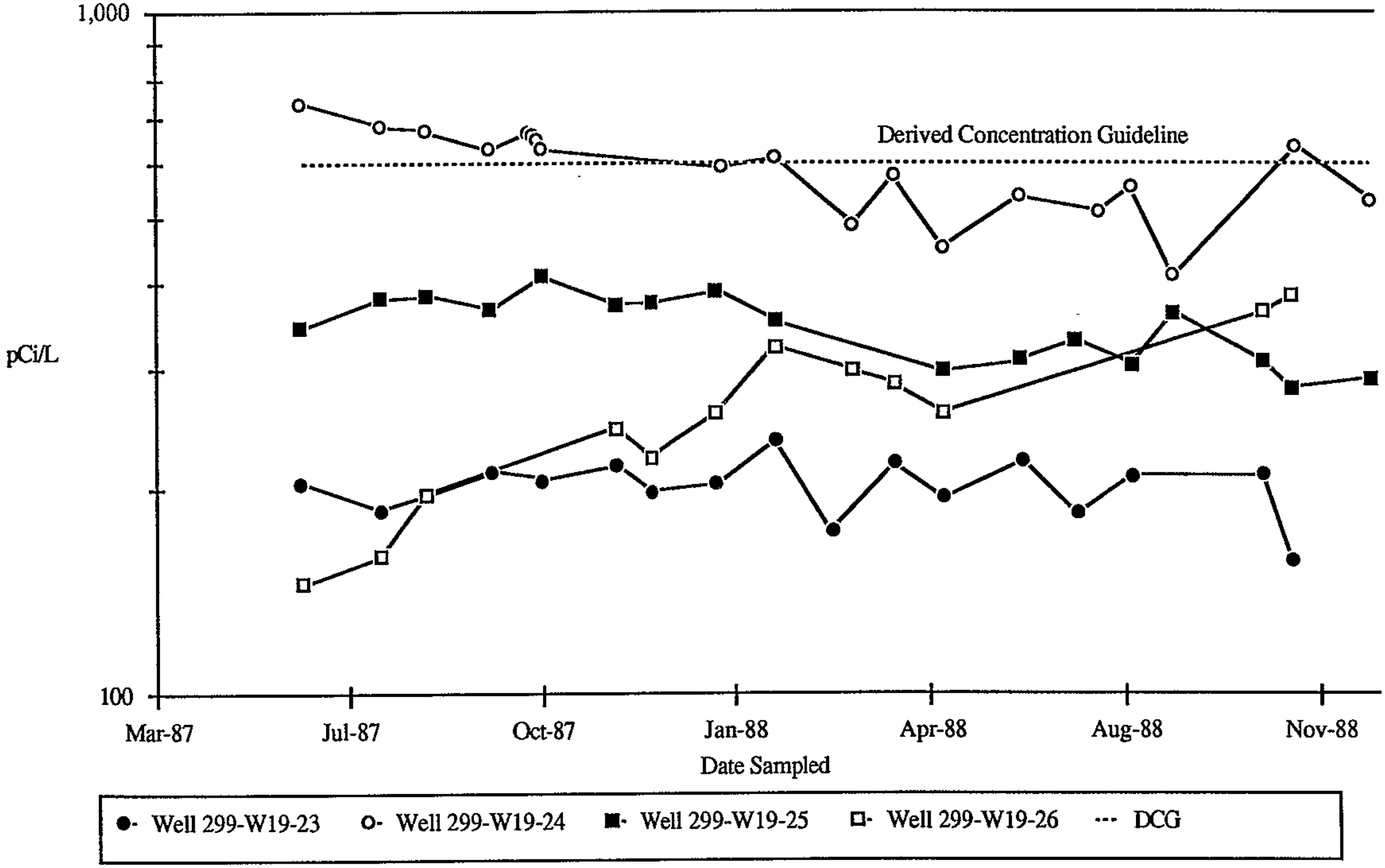

Figure D-8. Total Uranium in Groundwater at the 216-U-17 Crib.

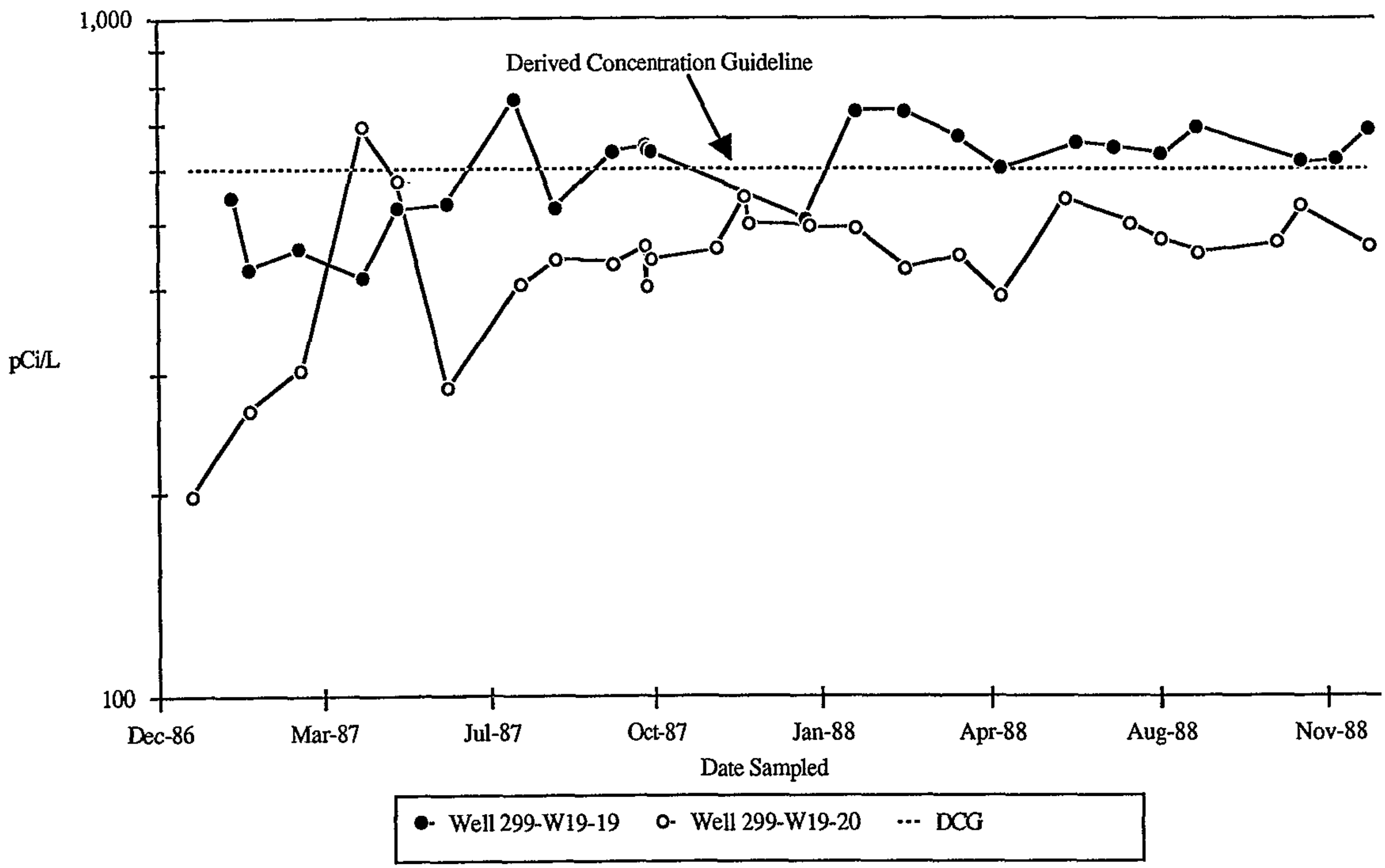

Figure D-9. Total Uranium in Groundwater at the 216-U-17 Crib.

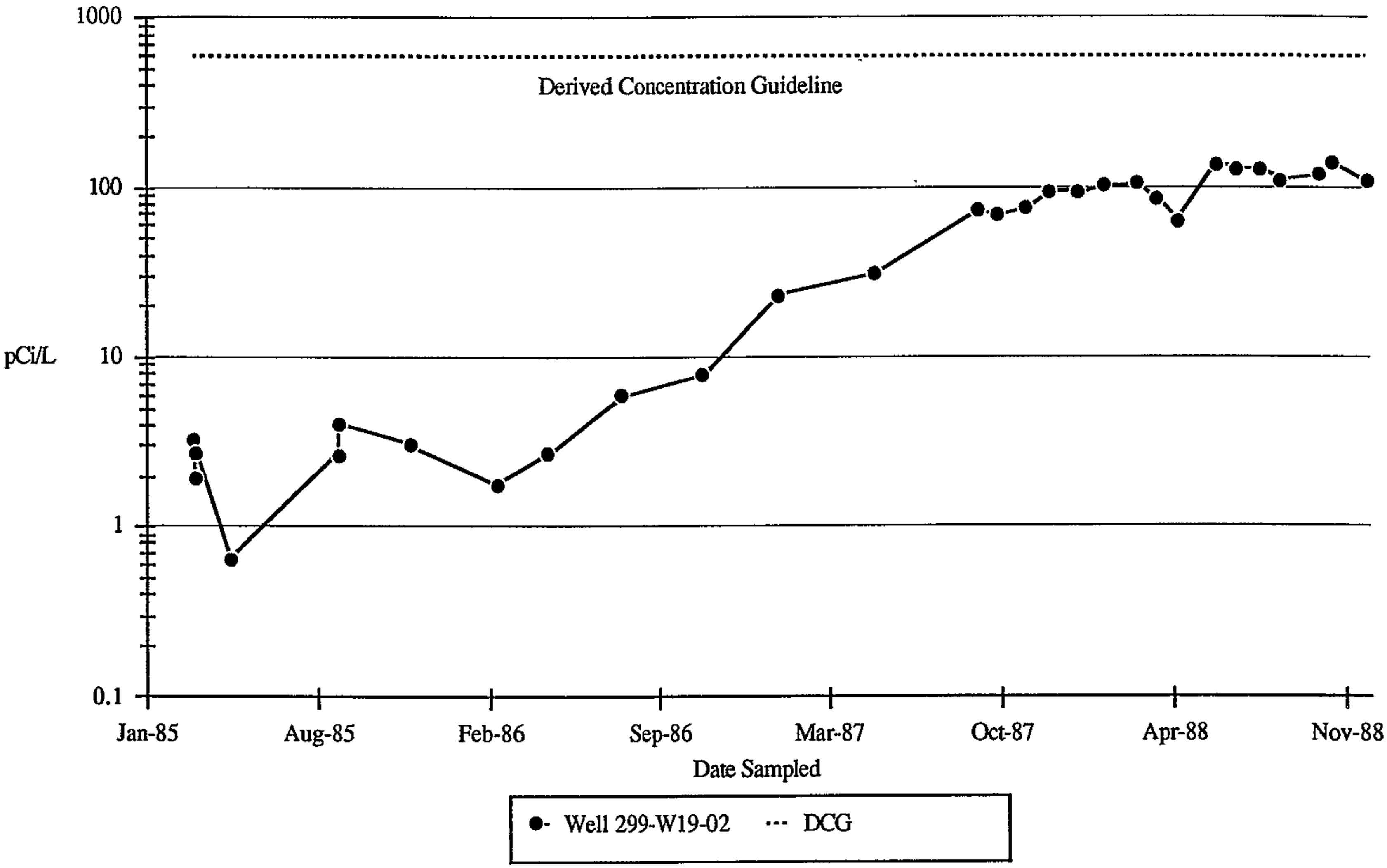

Figure D-10. Total Uranium in Groundwater at 216-U-08 Crib.

APPENDIX E

SOIL AND BIOTA MONITORING FIGURES AND TABLES

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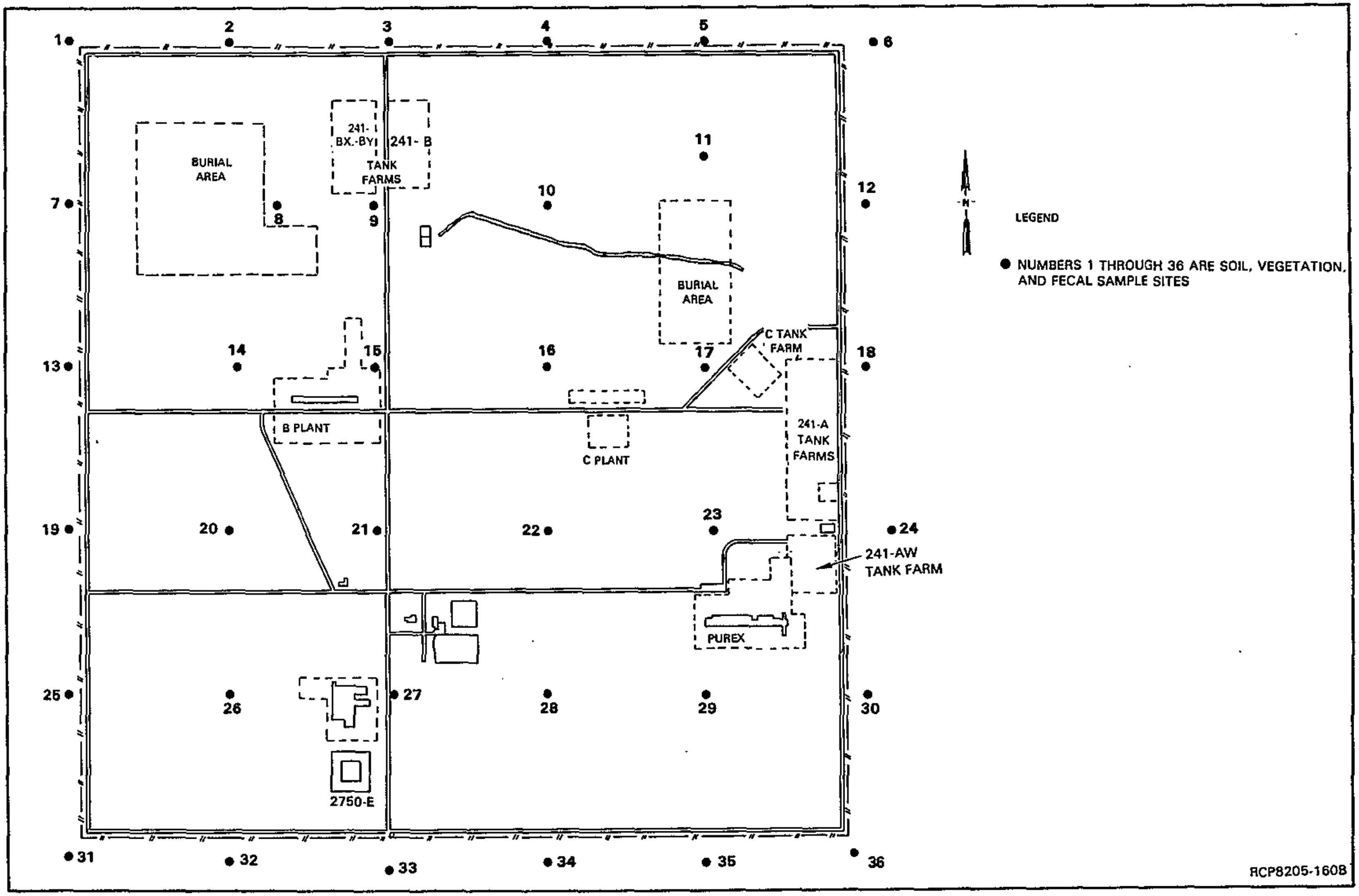

Figure E-1. The 200 East Area Grid Sampling Sites.

9 2 1 2 4 6 2 0 3 5 9

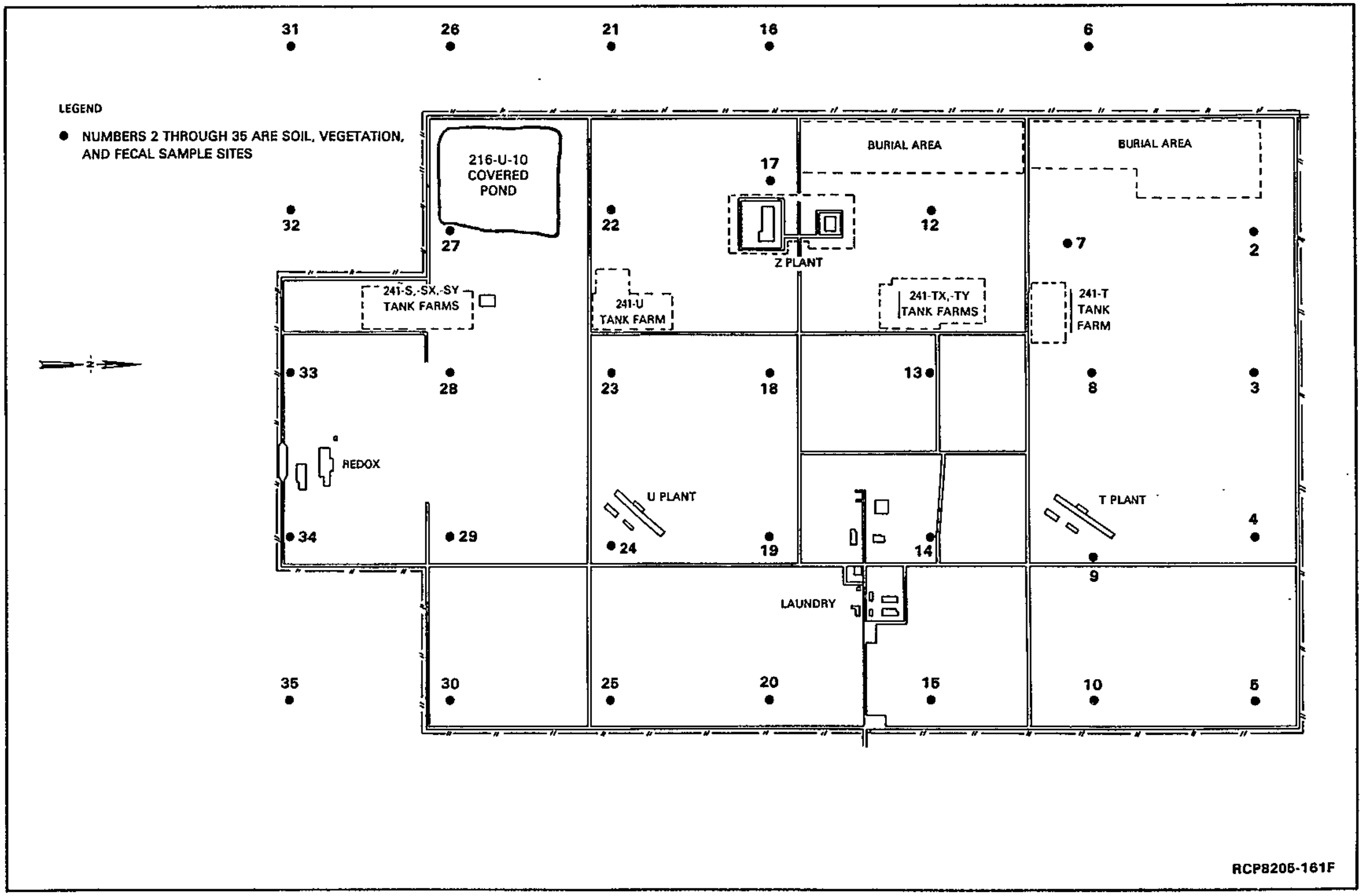

Figure E-2. The 200 West Area Grid Sampling Sites.

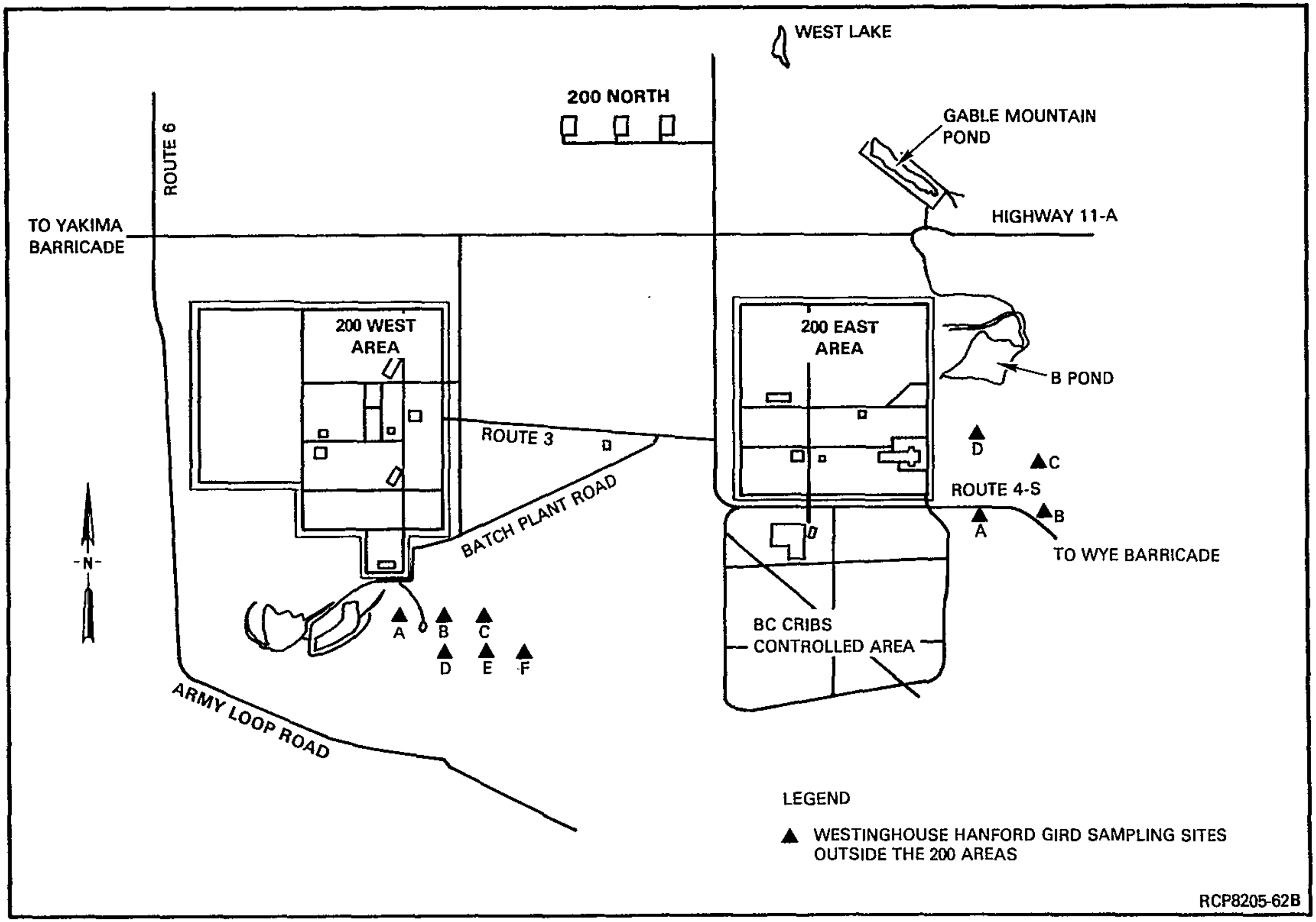

Figure E-3. Grid Sampling Outside the 200 Area Perimeter Fences.

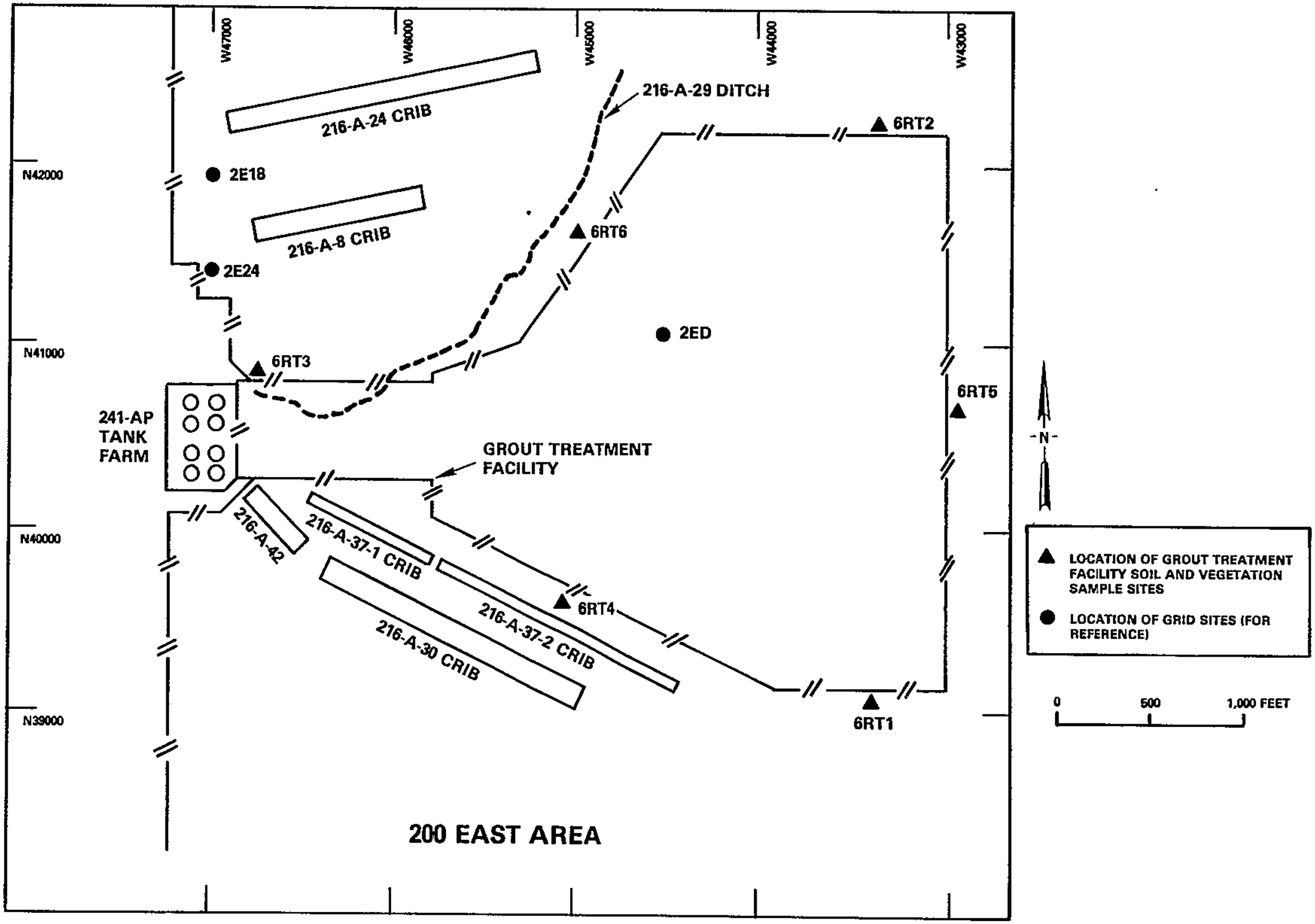

Figure E-4. Location of Grout Treatment Facility Sample Sites.

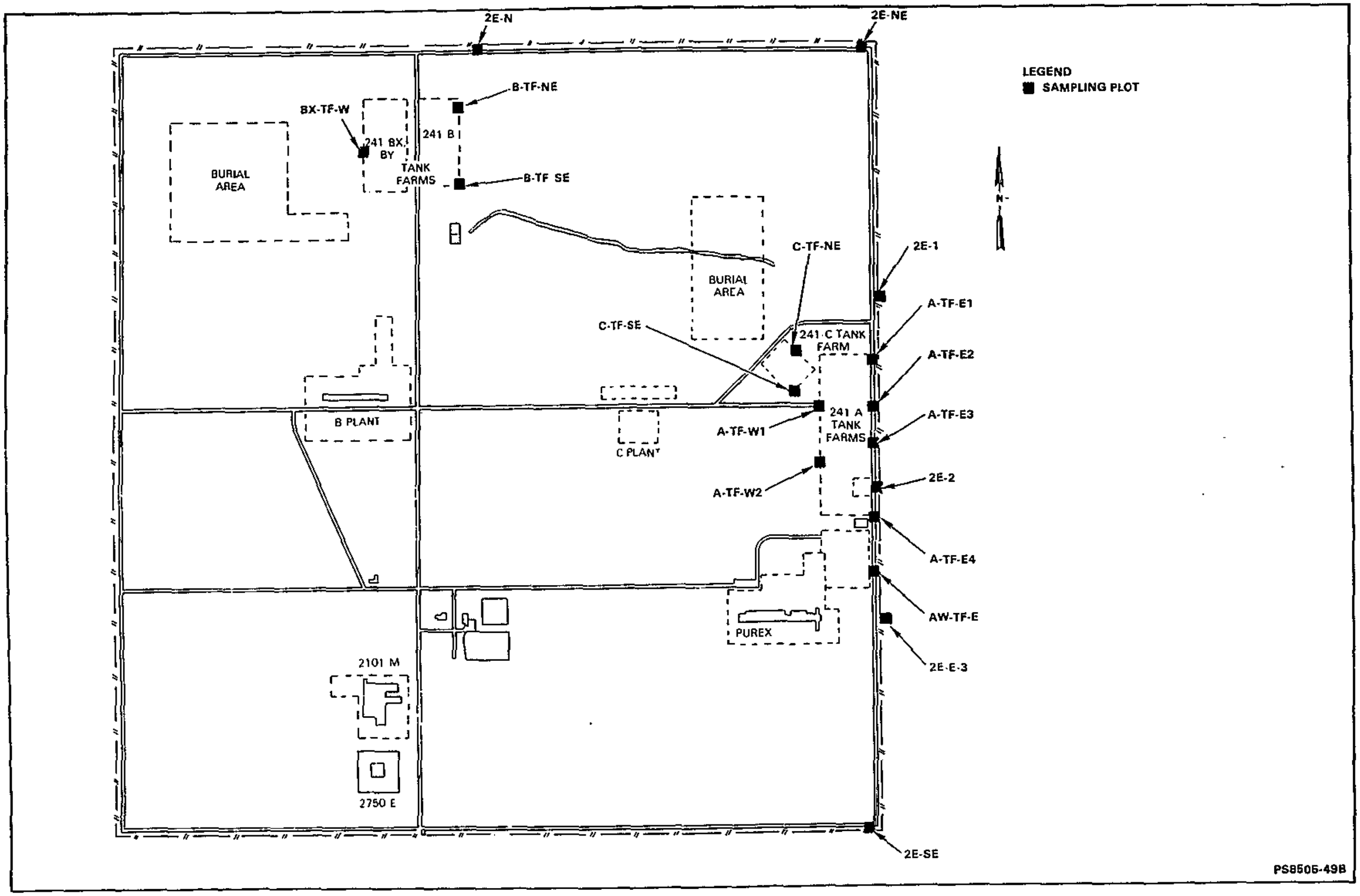

Figure E-5. Fenceline Soil Sampling Plots in the 200 East Area.

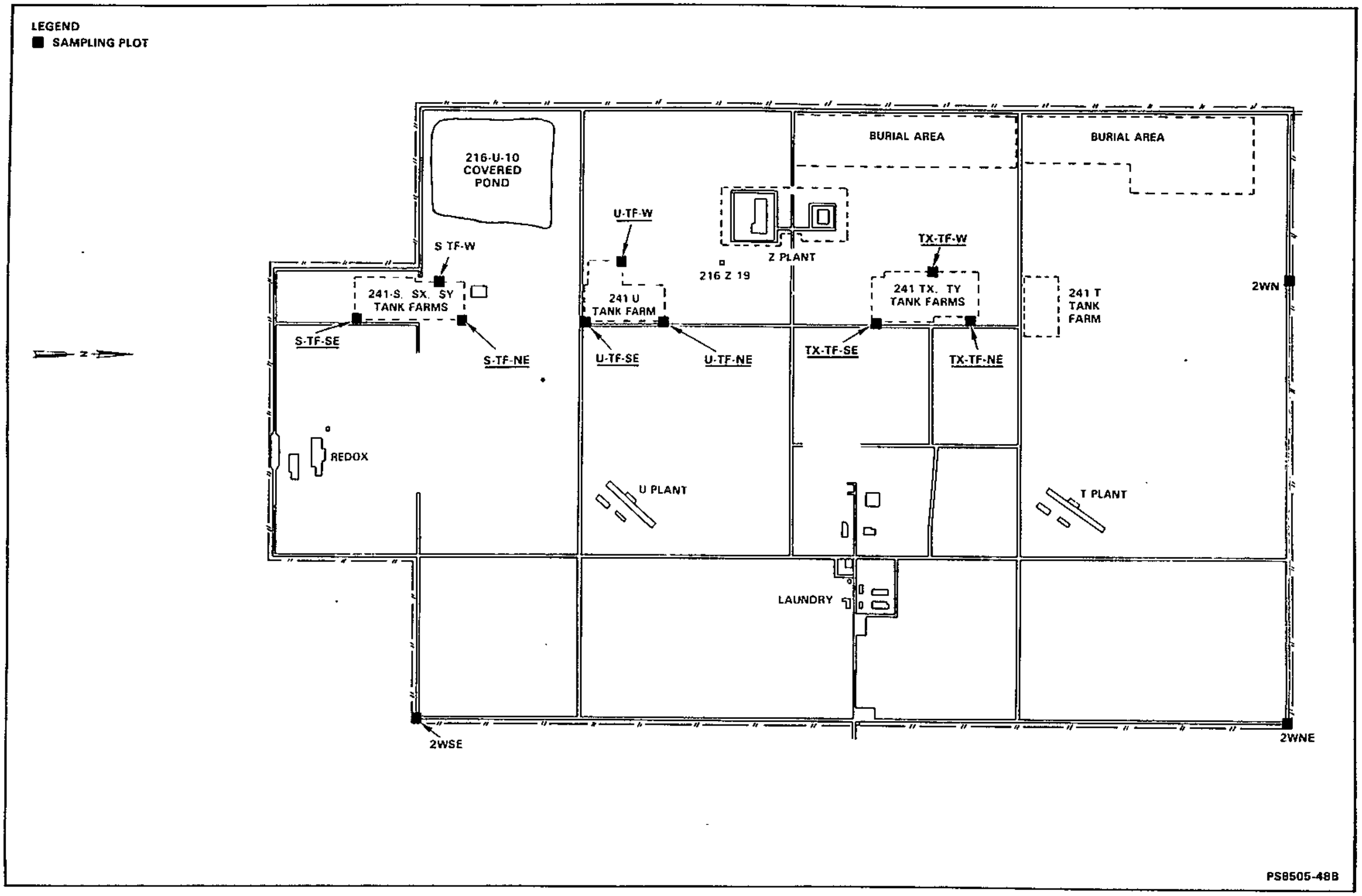

Figure E-6. Fenceline Soil Sampling Plots in the 200 West Area.

Table E-1. Grid Site Soil Results for 200 East Area for 1988 (pCi/g dry weight). (Sheet 1 of 4)

Location	Mn-54 ± Error	Co-58 ± Error	Co-60 ± Error	Zn-65 ± Error	Sr-90 ± Error
2E 1	1.8E-2 ± 1.6E-2	< -9.3E-3 ± 1.8E-2	< -3.7E-3 ± 1.8E-2	< -8.2E-2 ± 4.7E-2	4.4E-1 ± 8.3E-2
2E 2	< 6.0E-3 ± 1.6E-2	< 4.7E-3 ± 1.7E-2	1.8E-2 ± 1.7E-2	< -1.2E-1 ± 4.5E-2	7.9E-2 ± 1.7E-2
2E 3	< 1.6E-3 ± 1.8E-2	< -6.8E-3 ± 1.6E-2	< 0.0E+0 ± 1.6E-2	< -9.2E-2 ± 5.1E-2	9.6E-1 ± 1.9E-1
2E 4	< 1.8E-2 ± 2.0E-2	< -1.4E-2 ± 2.0E-2	< -7.1E-3 ± 2.0E-2	< -1.6E-1 ± 6.3E-2	1.1E+0 ± 2.1E-1
2E 5	< 5.4E-3 ± 1.8E-2	< 9.7E-3 ± 1.8E-2	1.8E-2 ± 1.8E-2	< -4.4E-2 ± 4.8E-2	4.1E-1 ± 7.8E-2
2E 6	< 7.4E-3 ± 2.1E-2	< 1.9E-3 ± 2.0E-2	< -5.3E-3 ± 2.3E-2	5.9E-2 ± 4.9E-2	6.2E-1 ± 1.2E-1
2E 7	< -5.9E-3 ± 1.6E-2	< 8.0E-3 ± 1.5E-2	< -1.4E-3 ± 1.7E-2	< -4.6E-2 ± 4.2E-2	3.3E-1 ± 6.4E-2
2E 8	2.4E-2 ± 1.9E-2	< 1.2E-2 ± 2.0E-2	< 1.1E-2 ± 2.0E-2	< -8.8E-2 ± 5.7E-2	5.1E-1 ± 9.9E-2
2E 9	< -1.6E-2 ± 1.6E-2	< -4.8E-3 ± 1.5E-2	< -2.2E-3 ± 1.6E-2	< -3.6E-2 ± 3.6E-2	2.0E+0 ± 3.8E-1
2E10	< 1.5E-2 ± 1.8E-2	< 7.8E-4 ± 1.8E-2	< -7.4E-4 ± 1.8E-2	< -6.8E-2 ± 4.8E-2	1.5E+0 ± 3.0E-1
2E11	2.6E-2 ± 1.6E-2	< -5.0E-3 ± 1.7E-2	< 7.7E-3 ± 1.7E-2	< -1.6E-2 ± 4.2E-2	2.7E+0 ± 5.1E-1
2E12	2.1E-2 ± 1.5E-2	< -4.8E-3 ± 1.6E-2	< 7.4E-4 ± 1.6E-2	< -1.2E-1 ± 4.8E-2	6.5E-1 ± 1.3E-1
2E13	< -4.4E-3 ± 1.5E-2	< 1.3E-3 ± 1.6E-2	< 1.3E-2 ± 1.7E-2	< -2.6E-2 ± 3.7E-2	1.3E-1 ± 2.6E-2
2E14	< 3.1E-3 ± 1.6E-2	< -1.1E-2 ± 1.7E-2	< 4.7E-3 ± 1.4E-2	< -9.0E-2 ± 5.1E-2	1.1E+0 ± 2.1E-1
2E15	< 6.4E-3 ± 1.8E-2	< -1.3E-2 ± 1.7E-2	< -1.5E-3 ± 1.8E-2	< -3.9E-2 ± 4.7E-2	9.1E-1 ± 1.8E-1
2E16	< -1.2E-3 ± 1.9E-2	< 6.5E-3 ± 1.7E-2	< 1.5E-2 ± 2.2E-2	< -6.4E-2 ± 4.8E-2	1.2E+0 ± 2.3E-1
2E17	< 1.4E-2 ± 1.7E-2	< 6.0E-4 ± 1.8E-2	< -3.0E-3 ± 2.0E-2	< -3.0E-2 ± 4.7E-2	3.4E+0 ± 6.2E-1
2E18	< 1.1E-2 ± 1.6E-2	< -2.2E-2 ± 1.7E-2	< -9.5E-3 ± 1.7E-2	< -9.8E-2 ± 5.0E-2	5.6E-1 ± 1.1E-1
2E19	< 1.2E-2 ± 1.7E-2	< -1.6E-2 ± 1.8E-2	< -8.8E-3 ± 1.9E-2	< -7.8E-2 ± 4.8E-2	1.9E-1 ± 3.7E-2
2E20	< 2.1E-3 ± 1.7E-2	< -7.0E-4 ± 1.6E-2	< -2.1E-2 ± 1.7E-2	< -4.8E-2 ± 4.3E-2	1.9E-1 ± 3.8E-2
2E21	< 5.5E-3 ± 1.7E-2	< 7.0E-3 ± 1.6E-2	< -2.0E-3 ± 1.5E-2	< -3.5E-2 ± 3.9E-2	2.0E-1 ± 3.9E-2
2E22	< 1.3E-2 ± 1.8E-2	< 4.4E-3 ± 1.7E-2	< 8.6E-3 ± 1.3E-2	< -4.3E-2 ± 4.4E-2	1.7E-1 ± 3.4E-2
2E23	< 1.4E-2 ± 2.1E-2	< -2.2E-2 ± 1.8E-2	< 1.4E-2 ± 2.1E-2	< -1.1E-1 ± 5.8E-2	1.1E-1 ± 2.5E-2
2E24	< 1.3E-2 ± 1.9E-2	< -4.6E-3 ± 1.8E-2	< 8.6E-3 ± 1.7E-2	< -3.5E-2 ± 4.6E-2	< 1.8E-3 ± 5.7E-3
2E25	1.7E-2 ± 1.2E-2	1.6E-2 ± 1.4E-2	< 5.8E-3 ± 1.4E-2	< -5.6E-2 ± 4.0E-2	4.2E-2 ± 9.9E-3
2E26	< 1.3E-2 ± 1.7E-2	< -7.7E-3 ± 1.5E-2	< -6.8E-3 ± 1.8E-2	< -4.2E-2 ± 4.4E-2	6.8E-1 ± 1.3E-1
2E27	2.4E-2 ± 1.4E-2	< 5.9E-3 ± 1.2E-2	< 3.2E-3 ± 1.4E-2	< -1.4E-1 ± 4.6E-2	8.1E-1 ± 1.5E-1
2E28	< 8.4E-3 ± 1.7E-2	< 8.6E-3 ± 1.5E-2	< -6.6E-3 ± 1.5E-2	< -8.6E-2 ± 4.6E-2	2.6E-1 ± 5.0E-2
2E29	< 4.5E-4 ± 2.1E-2	2.7E-2 ± 2.2E-2	< 9.0E-3 ± 1.8E-2	< -1.6E-2 ± 5.8E-2	4.8E-1 ± 8.8E-2
2E30	< 2.3E-3 ± 1.8E-2	< -5.1E-3 ± 1.8E-2	< 3.0E-3 ± 2.0E-2	4.3E-2 ± 4.0E-2	4.2E-1 ± 7.7E-2
2E31	< 1.0E-2 ± 1.4E-2	< 1.8E-3 ± 1.2E-2	< 1.1E-2 ± 1.4E-2	< -3.8E-2 ± 3.5E-2	1.6E-1 ± 3.2E-2
2E32	< 4.8E-3 ± 1.6E-2	< -1.7E-2 ± 1.8E-2	< -2.3E-3 ± 1.5E-2	< -5.6E-2 ± 4.0E-2	5.0E-1 ± 9.4E-2
2E33	< 1.7E-3 ± 1.4E-2	1.7E-2 ± 1.3E-2	< -4.5E-3 ± 1.5E-2	< -4.5E-2 ± 4.0E-2	7.2E-2 ± 1.6E-2
2E34	< 4.6E-3 ± 1.7E-2	< -1.1E-2 ± 1.7E-2	< -1.5E-2 ± 1.7E-2	< -4.0E-2 ± 4.3E-2	6.3E-1 ± 1.2E-1
2E35	2.0E-2 ± 1.5E-2	< -4.1E-3 ± 1.5E-2	< -9.5E-3 ± 1.7E-2	< -1.2E-2 ± 4.1E-2	3.2E-1 ± 6.1E-2
2E36	< 1.3E-2 ± 1.6E-2	< -1.1E-2 ± 1.6E-2	< 2.5E-3 ± 1.9E-2	< -2.6E-2 ± 4.3E-2	8.9E-1 ± 1.6E-1
2EA	1.9E-2 ± 1.6E-2	< -9.7E-3 ± 1.7E-2	< 1.2E-2 ± 2.0E-2	< -3.5E-2 ± 4.6E-2	1.4E-1 ± 2.8E-2
2EB	< -2.7E-3 ± 1.5E-2	< 2.5E-3 ± 1.5E-2	< 2.0E-3 ± 1.7E-2	< -1.6E-2 ± 4.3E-2	2.8E-1 ± 5.3E-2
2EC	< 8.5E-3 ± 1.5E-2	< 4.6E-3 ± 1.4E-2	< 8.8E-3 ± 1.3E-2	< -4.0E-2 ± 3.9E-2	3.4E-1 ± 6.5E-2
2ED	2.4E-2 ± 1.7E-2	< -1.0E-2 ± 1.4E-2	< -7.1E-3 ± 1.7E-2	< -1.6E-1 ± 5.3E-2	8.0E-1 ± 1.5E-1
GRT1	< 4.2E-3 ± 1.3E-2	< 1.0E-2 ± 1.1E-2	< -3.2E-3 ± 1.3E-2	< -1.7E-2 ± 2.8E-2	3.0E-1 ± 5.8E-2
GRT2	< -2.2E-3 ± 1.6E-2	< -1.1E-3 ± 1.4E-2	< -7.4E-3 ± 1.5E-2	< -1.8E-2 ± 4.1E-2	4.8E-1 ± 9.4E-2
GRT4	< 1.3E-2 ± 1.5E-2	< 9.3E-3 ± 1.4E-2	< -4.3E-3 ± 1.4E-2	< -6.6E-2 ± 4.1E-2	3.8E-1 ± 7.2E-2
GRT5	< 1.3E-3 ± 1.4E-2	< -7.1E-3 ± 1.2E-2	< -9.3E-3 ± 1.2E-2	< -8.2E-2 ± 3.8E-2	3.3E-1 ± 6.5E-2
GRT6	< 6.0E-4 ± 1.5E-2	< -4.0E-3 ± 1.5E-2	< 6.3E-3 ± 1.4E-2	< -1.3E-2 ± 3.6E-2	2.1E-1 ± 4.1E-2
Maximum	2.6E-2	2.7E-2	1.8E-2	5.9E-2	3.4E+0
Minimum	-1.6E-2	-2.2E-2	-2.1E-2	-1.6E-1	1.8E-3
Mean	8.7E-3	-1.4E-3	8.6E-4	-5.5E-2	6.2E-1
Background (b)					2.0E-1
Soil standards		10,000	5,000		600

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Table E-1. Grid Site Soil Results for 200 East Area for 1988 (pCi/g dry weight). (Sheet 2 of 4)

Location	Zr-95 ± Error	Ru-106 ± Error	I-129 ± Error	Cs-134 ± Error	Cs-137 ± Error
2E 1	< 2.7E-2 ± 3.4E-2	< -1.8E-1 ± 1.7E-1	a	< -9.0E-2 ± 2.4E-2	3.2E+0 ± 3.3E-1
2E 2	< -7.3E-3 ± 2.7E-2	< 0.0E+0 ± 1.3E-1	a	< -1.2E-2 ± 1.3E-2	2.5E-1 ± 3.7E-2
2E 3	< 1.8E-2 ± 3.1E-2	< 1.5E-1 ± 2.4E-1	a	< -9.7E-2 ± 2.9E-2	1.4E+1 ± 1.4E+0
2E 4	< 3.7E-2 ± 3.8E-2	< -2.0E-1 ± 3.0E-1	a	< -8.3E-2 ± 3.5E-2	1.8E+1 ± 1.8E+0
2E 5	< 6.4E-3 ± 3.6E-2	< 8.0E-2 ± 1.8E-1	a	< 6.0E-3 ± 1.8E-2	4.2E+0 ± 4.3E-1
2E 6	< 8.1E-4 ± 3.9E-2	< 6.5E-2 ± 2.3E-1	a	< 7.5E-3 ± 2.2E-2	3.9E+0 ± 4.1E-1
2E 7	< -5.5E-3 ± 3.0E-2	< -4.7E-2 ± 1.5E-1	a	< -1.0E-2 ± 1.6E-2	1.8E+0 ± 1.9E-1
2E 8	3.7E-2 ± 3.4E-2	< -2.2E-1 ± 2.3E-1	a	< -9.6E-2 ± 2.8E-2	8.5E+0 ± 8.7E-1
2E 9	< 4.0E-3 ± 2.6E-2	< 8.6E-2 ± 2.2E-1	a	< 1.4E-2 ± 2.3E-2	2.2E+1 ± 2.3E+0
2E10	< -4.6E-3 ± 3.4E-2	< 1.1E-1 ± 3.9E-1	a	< -8.4E-3 ± 3.6E-2	3.5E+1 ± 3.5E+0
2E11	< 1.4E-2 ± 3.3E-2	< 3.5E-2 ± 1.8E-1	a	< -2.4E-4 ± 1.9E-2	8.6E+0 ± 8.7E-1
2E12	< 1.3E-2 ± 2.9E-2	< -2.2E-1 ± 1.8E-1	a	< -8.5E-3 ± 1.8E-2	6.8E+0 ± 6.9E-1
2E13	< 1.1E-2 ± 2.7E-2	< -1.1E-1 ± 1.2E-1	a	< -3.7E-3 ± 1.3E-2	4.9E-1 ± 6.0E-2
2E14	< 3.9E-3 ± 3.1E-2	< -5.2E-2 ± 1.6E-1	a	< -6.9E-2 ± 2.1E-2	2.5E+0 ± 2.6E-1
2E15	< 5.9E-3 ± 3.1E-2	< -4.0E-2 ± 1.6E-1	a	< -8.5E-3 ± 1.7E-2	1.7E+0 ± 1.8E-1
2E16	< 1.8E-2 ± 3.5E-2	< -1.0E-2 ± 1.7E-1	a	< -4.5E-3 ± 1.8E-2	3.0E+0 ± 3.1E-1
2E17	< 1.9E-2 ± 3.2E-2	< -2.6E-2 ± 2.0E-1	a	< -1.8E-3 ± 2.1E-2	6.4E+0 ± 6.5E-1
2E18	3.5E-2 ± 2.9E-2	< 5.5E-2 ± 1.6E-1	a	< -3.8E-2 ± 1.9E-2	3.2E+0 ± 3.3E-1
2E19	< 1.5E-2 ± 3.1E-2	< 1.1E-1 ± 1.5E-1	a	< -2.6E-2 ± 1.6E-2	9.0E-1 ± 1.0E-1
2E20	3.8E-2 ± 3.0E-2	< -1.0E-1 ± 1.3E-1	a	< -2.1E-4 ± 1.5E-2	7.0E-1 ± 8.2E-2
2E21	< -2.3E-2 ± 3.0E-2	< 3.7E-2 ± 1.4E-1	a	< -2.5E-3 ± 1.4E-2	7.2E-1 ± 8.5E-2
2E22	< -1.6E-3 ± 3.0E-2	< -8.8E-2 ± 1.4E-1	a	< -1.4E-2 ± 1.7E-2	1.5E+0 ± 1.6E-1
2E23	< 1.2E-2 ± 3.6E-2	< 1.1E-2 ± 2.4E-1	a	< -7.9E-2 ± 2.9E-2	9.6E+0 ± 9.8E-1
2E24	< -1.8E-3 ± 3.5E-2	< -1.0E-2 ± 2.1E-1	a	< -1.2E-2 ± 2.0E-2	5.8E+0 ± 5.9E-1
2E25	< 1.5E-2 ± 2.5E-2	< 0.0E+0 ± 1.2E-1	a	< -8.1E-3 ± 1.3E-2	4.6E-1 ± 5.7E-2
2E26	< -4.6E-3 ± 3.3E-2	< 1.2E-2 ± 1.4E-1	a	< 2.6E-3 ± 1.5E-2	8.0E-1 ± 9.4E-2
2E27	< 1.3E-3 ± 2.4E-2	< 5.5E-2 ± 1.0E-1	a	< -4.1E-3 ± 1.2E-2	1.3E-1 ± 2.5E-2
2E28	< 5.6E-3 ± 2.7E-2	< -6.8E-3 ± 1.2E-1	a	< -1.8E-2 ± 1.5E-2	3.3E-1 ± 4.4E-2
2E29	< -1.0E-2 ± 4.5E-2	< 1.4E-1 ± 2.2E-1	a	< 3.0E-3 ± 2.2E-2	3.2E+0 ± 3.4E-1
2E30	< 2.0E-2 ± 3.3E-2	3.2E-1 ± 1.7E-1	a	< 1.4E-2 ± 1.6E-2	3.2E-1 ± 4.6E-2
2E31	2.7E-2 ± 2.7E-2	< 4.6E-2 ± 1.1E-1	a	< -6.9E-3 ± 1.3E-2	4.5E-1 ± 5.7E-2
2E32	< 2.6E-3 ± 2.9E-2	< 2.6E-2 ± 1.3E-1	a	< -1.8E-2 ± 1.5E-2	7.3E-1 ± 8.5E-2
2E33	< 1.4E-2 ± 2.6E-2	< -5.1E-2 ± 1.1E-1	a	< -1.5E-3 ± 1.2E-2	5.9E-2 ± 1.9E-2
2E34	< 7.5E-3 ± 3.0E-2	< 7.6E-2 ± 1.3E-1	a	< -2.1E-2 ± 1.5E-2	7.6E-1 ± 9.0E-2
2E35	< 5.2E-3 ± 2.7E-2	< -6.4E-2 ± 1.4E-1	a	< 4.4E-4 ± 1.4E-2	5.1E-1 ± 6.6E-2
2E36	< 3.1E-2 ± 3.3E-2	< -6.0E-2 ± 1.6E-1	a	2.1E-2 ± 1.6E-2	8.2E-1 ± 9.6E-2
2EA	< -3.9E-3 ± 3.0E-2	< 1.7E-2 ± 1.4E-1	a	< -6.8E-3 ± 1.5E-2	3.9E-1 ± 5.5E-2
2EB	< 1.7E-2 ± 2.9E-2	< -2.8E-2 ± 1.4E-1	a	< -7.7E-2 ± 2.0E-2	1.1E+0 ± 1.2E-1
2EC	< -9.1E-4 ± 2.5E-2	< -1.4E-2 ± 1.2E-1	a	< -2.5E-2 ± 1.3E-2	1.3E+0 ± 1.4E-1
2ED	< -1.6E-2 ± 2.8E-2	< 6.4E-2 ± 1.5E-1	a	< -5.6E-3 ± 1.5E-2	3.4E+0 ± 3.5E-1
GRT1	< -8.7E-3 ± 2.2E-2	< -4.0E-2 ± 1.0E-1	3.3E-1 ± 2.8E-1	< -4.4E-3 ± 1.1E-2	7.1E-1 ± 7.9E-2
GRT2	3.0E-2 ± 2.8E-2	< 9.4E-2 ± 1.3E-1	< 1.6E-2 ± 3.4E-1	< 3.4E-3 ± 1.4E-2	2.3E+0 ± 2.4E-1
GRT4	< -1.6E-2 ± 2.8E-2	< 5.3E-2 ± 1.2E-1	< -5.7E-1 ± 5.7E-1	< -7.3E-3 ± 1.4E-2	1.2E+0 ± 1.3E-1
GRT5	< 1.5E-2 ± 2.3E-2	< 5.2E-2 ± 1.1E-1	< -2.6E-1 ± 5.1E-1	< 8.1E-4 ± 1.2E-2	1.3E+0 ± 1.3E-1
GRT6	< 2.3E-2 ± 2.7E-2	< 3.6E-2 ± 1.2E-1	4.6E-1 ± 2.7E-1	< -4.5E-3 ± 1.3E-2	1.2E+0 ± 1.3E-1
Maximum	3.8E-2	3.2E-1	4.6E-1	2.1E-2	3.5E+1
Minimum	-2.3E-2	-2.2E-1	-5.7E-1	-9.7E-2	5.9E-2
Mean	9.4E-3	3.5E-3	-5.2E-3	-1.8E-2	4.1E+0
Background (b)					7.7E-1
Soil standards			4,000	10,000	20,000

Table E-1. Grid Site Soil Results for 200 East Area for 1988 (pCi/g dry weight). (Sheet 3 of 4)

Location	Ce-144 ± Error	Eu-152 ± Error	Eu-154 ± Error	Eu-155 ± Error	Pb-214 ± Error
2E 1	< -4.3E-2 ± 1.1E-1	9.3E-2 ± 7.7E-2	< -2.1E-2 ± 5.8E-2	< 5.4E-2 ± 6.7E-2	7.0E-1 ± 9.8E-2
2E 2	< -2.1E-4 ± 8.6E-2	< 5.0E-2 ± 7.4E-2	< 1.4E-2 ± 5.7E-2	6.7E-2 ± 4.8E-2	7.9E-1 ± 9.7E-2
2E 3	< 1.1E-1 ± 1.6E-1	1.2E-1 ± 8.3E-2	< -1.3E-2 ± 6.6E-2	< 8.2E-2 ± 9.2E-2	7.2E-1 ± 1.3E-1
2E 4	< -8.2E-2 ± 2.0E-1	< 3.4E-2 ± 9.9E-2	< -1.8E-2 ± 6.6E-2	< 5.8E-2 ± 1.3E-1	8.4E-1 ± 1.4E-1
2E 5	< 4.6E-2 ± 1.4E-1	1.0E-1 ± 8.9E-2	< -7.5E-2 ± 6.8E-2	< 5.3E-2 ± 8.3E-2	7.6E-1 ± 1.1E-1
2E 6	< -5.9E-2 ± 1.6E-1	< 7.9E-2 ± 9.6E-2	< 8.6E-3 ± 6.5E-2	< 5.3E-2 ± 9.8E-2	7.5E-1 ± 1.1E-1
2E 7	< 4.4E-2 ± 1.0E-1	8.1E-2 ± 7.8E-2	< 2.4E-2 ± 5.3E-2	6.6E-2 ± 5.8E-2	7.2E-1 ± 9.4E-2
2E 8	< 9.7E-2 ± 1.4E-1	< 6.6E-2 ± 9.4E-2	< -4.3E-2 ± 6.9E-2	< 6.2E-2 ± 8.1E-2	7.2E-1 ± 1.1E-1
2E 9	< -8.2E-2 ± 1.6E-1	1.1E-1 ± 7.9E-2	< -3.5E-3 ± 4.9E-2	< 2.4E-4 ± 8.6E-2	7.2E-1 ± 1.2E-1
2E10	< -3.9E-2 ± 2.3E-1	< 6.7E-2 ± 1.1E-1	< 2.5E-2 ± 6.7E-2	< 1.9E-2 ± 1.4E-1	8.0E-1 ± 1.5E-1
2E11	< 6.0E-2 ± 1.3E-1	1.2E-1 ± 9.9E-2	< -5.5E-2 ± 5.4E-2	< 1.8E-2 ± 7.1E-2	7.9E-1 ± 1.1E-1
2E12	< -1.1E-2 ± 1.1E-1	< 6.8E-2 ± 7.1E-2	< -1.8E-2 ± 5.2E-2	7.3E-2 ± 6.2E-2	7.4E-1 ± 1.1E-1
2E13	< 1.2E-2 ± 9.5E-2	8.1E-2 ± 7.6E-2	< -7.2E-2 ± 5.7E-2	< 2.3E-2 ± 6.3E-2	5.7E-1 ± 7.8E-2
2E14	< 2.7E-2 ± 1.2E-1	1.4E-1 ± 8.6E-2	< -3.0E-2 ± 6.5E-2	< 7.2E-2 ± 7.2E-2	6.5E-1 ± 8.9E-2
2E15	< -7.7E-3 ± 1.1E-1	< 4.9E-2 ± 7.7E-2	< 5.7E-2 ± 5.7E-2	< 4.1E-2 ± 6.2E-2	6.6E-1 ± 9.0E-2
2E16	< -1.3E-1 ± 1.3E-1	8.6E-2 ± 7.8E-2	< -4.3E-2 ± 5.8E-2	< -1.9E-3 ± 7.5E-2	6.6E-1 ± 9.2E-2
2E17	< 5.6E-2 ± 1.5E-1	8.4E-2 ± 8.3E-2	< -3.3E-2 ± 6.1E-2	< 2.3E-2 ± 8.1E-2	5.4E-1 ± 9.1E-2
2E18	< 1.4E-2 ± 1.1E-1	< 3.5E-2 ± 7.8E-2	< 7.5E-3 ± 5.6E-2	< 5.1E-2 ± 7.2E-2	6.3E-1 ± 8.8E-2
2E19	< 2.3E-2 ± 1.2E-1	< 5.8E-2 ± 9.7E-2	< 6.3E-3 ± 6.1E-2	8.3E-2 ± 7.1E-2	7.2E-1 ± 9.5E-2
2E20	< -7.0E-3 ± 1.0E-1	1.0E-1 ± 7.9E-2	8.0E-2 ± 5.5E-2	< 5.5E-2 ± 6.4E-2	6.5E-1 ± 8.9E-2
2E21	< 6.2E-2 ± 9.6E-2	< 1.2E-2 ± 7.9E-2	< 4.0E-2 ± 5.7E-2	< 1.7E-2 ± 5.5E-2	6.6E-1 ± 8.6E-2
2E22	< -1.1E-2 ± 9.2E-2	7.3E-2 ± 7.3E-2	< 2.3E-2 ± 5.0E-2	6.9E-2 ± 5.3E-2	7.8E-1 ± 9.9E-2
2E23	1.8E-1 ± 1.4E-1	1.6E-1 ± 9.6E-2	< 3.0E-2 ± 6.8E-2	< 3.1E-2 ± 8.2E-2	6.8E-1 ± 1.1E-1
2E24	< 7.6E-2 ± 1.5E-1	< 6.4E-2 ± 1.0E-1	< 2.5E-2 ± 5.6E-2	< 3.5E-2 ± 8.0E-2	6.6E-1 ± 9.9E-2
2E25	< -3.1E-2 ± 8.3E-2	7.5E-2 ± 5.6E-2	< 1.1E-2 ± 4.5E-2	5.0E-2 ± 5.0E-2	5.6E-1 ± 7.2E-2
2E26	< 3.0E-2 ± 1.2E-1	< 7.8E-2 ± 8.1E-2	< 5.5E-2 ± 5.7E-2	< 5.8E-2 ± 6.2E-2	6.5E-1 ± 9.1E-2
2E27	< 4.7E-2 ± 7.3E-2	< 2.9E-2 ± 6.3E-2	< 2.2E-2 ± 4.4E-2	< 3.6E-2 ± 4.0E-2	5.6E-1 ± 7.4E-2
2E28	< -6.2E-2 ± 8.7E-2	< 6.4E-2 ± 7.7E-2	< 8.8E-3 ± 4.8E-2	< 3.5E-2 ± 5.0E-2	8.0E-1 ± 1.0E-1
2E29	< -1.6E-1 ± 1.5E-1	< -2.2E-3 ± 1.2E-1	< 9.5E-3 ± 7.3E-2	< 2.8E-2 ± 8.3E-2	7.6E-1 ± 1.1E-1
2E30	< 8.3E-3 ± 1.2E-1	< 2.1E-2 ± 9.9E-2	< 3.1E-2 ± 4.8E-2	< 2.8E-2 ± 7.5E-2	6.5E-1 ± 8.9E-2
2E31	< -6.3E-2 ± 6.8E-2	7.8E-2 ± 5.8E-2	< 2.3E-2 ± 4.7E-2	< 3.5E-2 ± 3.9E-2	5.7E-1 ± 7.4E-2
2E32	< -7.1E-2 ± 9.4E-2	< 8.2E-3 ± 7.8E-2	< -4.6E-2 ± 5.1E-2	< 3.3E-2 ± 5.4E-2	6.1E-1 ± 8.0E-2
2E33	< -5.0E-3 ± 7.5E-2	< 5.7E-2 ± 7.1E-2	< -1.7E-2 ± 4.9E-2	4.5E-2 ± 4.1E-2	5.1E-1 ± 6.7E-2
2E34	< 9.9E-3 ± 1.1E-1	1.3E-1 ± 9.1E-2	< -2.0E-3 ± 6.2E-2	< 5.2E-2 ± 6.9E-2	7.9E-1 ± 9.9E-2
2E35	< 2.7E-2 ± 9.3E-2	1.3E-1 ± 7.6E-2	< -3.1E-2 ± 5.3E-2	< 4.3E-2 ± 5.6E-2	6.5E-1 ± 8.8E-2
2E36	< 6.7E-2 ± 1.2E-1	< 4.3E-2 ± 9.6E-2	< -1.6E-2 ± 5.0E-2	< 4.4E-2 ± 7.1E-2	6.3E-1 ± 8.8E-2
2EA	< -1.1E-2 ± 9.0E-2	< 3.3E-2 ± 8.3E-2	< -4.7E-2 ± 6.2E-2	1.1E-1 ± 5.8E-2	5.4E-1 ± 7.6E-2
2EB	< -4.7E-3 ± 9.4E-2	1.4E-1 ± 7.4E-2	< -2.7E-2 ± 4.9E-2	5.8E-2 ± 5.7E-2	6.6E-1 ± 8.3E-2
2EC	< -5.0E-2 ± 9.0E-2	< 5.3E-2 ± 6.1E-2	< 4.4E-2 ± 4.8E-2	< 2.4E-2 ± 5.0E-2	6.3E-1 ± 8.1E-2
2ED	< 3.7E-2 ± 9.7E-2	1.3E-1 ± 8.5E-2	< -2.5E-2 ± 5.5E-2	< 4.6E-2 ± 5.3E-2	6.9E-1 ± 9.0E-2
GRT1	< -1.4E-2 ± 7.4E-2	< 5.8E-2 ± 6.3E-2	< -9.9E-4 ± 4.2E-2	5.1E-2 ± 4.2E-2	5.8E-1 ± 7.3E-2
GRT2	< -1.5E-2 ± 9.9E-2	< 7.6E-2 ± 7.6E-2	< -3.0E-2 ± 5.3E-2	7.3E-2 ± 5.8E-2	6.4E-1 ± 8.4E-2
GRT4	< -4.0E-3 ± 8.5E-2	1.2E-1 ± 7.5E-2	< -1.8E-2 ± 4.4E-2	6.7E-2 ± 4.7E-2	6.9E-1 ± 8.8E-2
GRT5	< -1.7E-2 ± 7.7E-2	< 4.6E-2 ± 6.4E-2	< 5.9E-3 ± 4.1E-2	< 4.1E-2 ± 4.3E-2	6.9E-1 ± 8.5E-2
GRT6	< 2.5E-3 ± 9.3E-2	< 6.9E-2 ± 7.1E-2	< 1.4E-2 ± 4.7E-2	5.9E-2 ± 5.3E-2	5.8E-1 ± 7.8E-2
Maximum	1.8E-1	1.6E-1	8.0E-2	1.1E-1	8.4E-1
Minimum	-1.6E-1	-2.2E-3	-7.5E-2	-1.9E-3	5.1E-1
Mean	1.3E-3	7.5E-2	-2.7E-3	4.7E-2	6.7E-1
Background (b)					
Soil standards	1,900	3,000	3,000	20,000	

Table E-1. Grid Site Soil Results for 200 East Area for 1988 (pCi/g dry weight). (Sheet 4 of 4)

Location	Pu-238 ± Error	Pu-239 ± Error	U-Total ± Error
2E 1	3.6E-3 ± 7.5E-4	2.2E-1 ± 2.4E-2	1.3E-1 ± 4.7E-2
2E 2	< -1.6E-5 ± 1.0E-4	2.0E-3 ± 5.6E-4	1.3E-1 ± 4.8E-2
2E 3	2.6E-4 ± 2.0E-4	2.1E-2 ± 2.8E-3	1.0E-1 ± 4.1E-2
2E 4	< 3.2E-4 ± 4.4E-4	3.1E-2 ± 5.2E-3	1.3E-1 ± 4.9E-2
2E 5	3.6E-4 ± 2.2E-4	2.3E-2 ± 2.9E-3	1.6E-1 ± 5.5E-2
2E 6	7.1E-4 ± 3.1E-4	2.5E-2 ± 3.1E-3	1.8E-1 ± 6.1E-2
2E 7	4.6E-4 ± 2.3E-4	3.8E-2 ± 4.3E-3	2.9E-1 ± 9.3E-2
2E 8	8.7E-4 ± 4.7E-4	5.4E-2 ± 6.4E-3	2.9E-1 ± 9.4E-2
2E 9	< 4.2E-4 ± 5.2E-4	1.7E-2 ± 3.1E-3	1.4E-1 ± 5.3E-2
2E10	< 1.4E-4 ± 6.3E-4	4.0E-2 ± 8.1E-3	1.5E-1 ± 5.3E-2
2E11	8.6E-4 ± 6.5E-4	4.2E-2 ± 6.2E-3	1.8E-1 ± 6.4E-2
2E12	< 4.4E-4 ± 5.7E-4	1.6E-2 ± 3.7E-3	2.1E-1 ± 7.0E-2
2E13	8.7E-4 ± 3.7E-4	1.1E-1 ± 1.2E-2	2.6E-1 ± 8.5E-2
2E14	4.0E-4 ± 2.2E-4	1.6E-2 ± 2.1E-3	1.8E-1 ± 6.3E-2
2E15	5.6E-4 ± 2.7E-4	7.4E-2 ± 8.2E-3	2.3E-1 ± 7.6E-2
2E16	1.0E-3 ± 4.0E-4	6.6E-2 ± 7.7E-3	2.6E-1 ± 8.5E-2
2E17	1.3E-3 ± 5.6E-4	3.2E-2 ± 4.3E-3	2.2E-1 ± 7.2E-2
2E18	< 7.3E-5 ± 1.0E-4	6.2E-3 ± 1.1E-3	2.1E-1 ± 7.0E-2
2E19	7.4E-4 ± 3.9E-4	2.7E-2 ± 3.5E-3	2.8E-1 ± 9.0E-2
2E20	< 1.1E-4 ± 1.2E-4	1.6E-2 ± 2.1E-3	3.2E-1 ± 1.0E-1
2E21	7.5E-4 ± 3.7E-4	4.8E-2 ± 6.0E-3	2.3E-1 ± 7.7E-2
2E22	6.4E-4 ± 3.0E-4	9.6E-2 ± 1.1E-2	3.7E-1 ± 1.2E-1
2E23	5.0E-3 ± 1.4E-3	1.6E-1 ± 1.9E-2	2.7E-1 ± 8.8E-2
2E24	6.2E-4 ± 4.4E-4	2.7E-2 ± 4.0E-3	3.2E-1 ± 1.0E-1
2E25	4.9E-4 ± 2.4E-4	1.3E-2 ± 1.7E-3	3.0E-1 ± 9.4E-2
2E26	5.4E-4 ± 2.8E-4	1.6E-2 ± 2.1E-3	4.0E-1 ± 1.2E-1
2E27	< 9.9E-5 ± 1.5E-4	1.8E-3 ± 4.5E-4	3.1E-1 ± 9.6E-2
2E28	2.6E-4 ± 1.9E-4	1.2E-2 ± 1.7E-3	5.2E-1 ± 1.5E-1
2E29	1.9E-3 ± 5.6E-4	6.8E-2 ± 7.8E-3	3.2E-1 ± 1.0E-1
2E30	5.4E-4 ± 2.4E-4	1.8E-2 ± 2.3E-3	1.7E-1 ± 5.9E-2
2E31	6.3E-4 ± 2.5E-4	1.3E-2 ± 1.6E-3	1.5E-1 ± 5.3E-2
2E32	1.3E-4 ± 1.1E-4	1.2E-2 ± 1.5E-3	2.6E-1 ± 8.4E-2
2E33	1.7E-4 ± 1.3E-4	8.0E-4 ± 2.8E-4	2.2E-1 ± 7.2E-2
2E34	2.9E-4 ± 1.6E-4	1.2E-2 ± 1.5E-3	3.9E-1 ± 1.2E-1
2E35	3.5E-4 ± 1.8E-4	1.1E-2 ± 1.4E-3	1.4E-1 ± 5.1E-2
2E36	4.7E-4 ± 2.4E-4	2.2E-2 ± 2.6E-3	1.1E-1 ± 4.2E-2
2EA	2.3E-4 ± 1.6E-4	7.8E-3 ± 1.1E-3	3.6E-1 ± 1.1E-1
2EB	3.9E-4 ± 2.6E-4	2.5E-2 ± 3.0E-3	3.4E-1 ± 1.1E-1
2EC	< 8.3E-5 ± 1.6E-4	1.1E-2 ± 1.6E-3	2.4E-1 ± 8.0E-2
2ED	9.0E-4 ± 3.1E-4	3.9E-2 ± 4.3E-3	3.2E-1 ± 1.0E-1
GRT1	< 1.4E-4 ± 2.2E-4	7.3E-3 ± 1.8E-3	a
GRT2	< -1.6E-5 ± 4.3E-4	1.1E-2 ± 3.1E-3	a
GRT4	< 3.3E-4 ± 3.3E-4	2.0E-2 ± 3.2E-3	a
GRT5	3.9E-4 ± 2.6E-4	1.3E-2 ± 2.1E-3	a
GRT6	< -1.6E-5 ± 1.7E-4	5.9E-3 ± 1.4E-3	a
Maximum	5.0E-3	2.2E-1	5.2E-1
Minimum	-1.6E-5	8.0E-4	1.0E-1
Mean	6.4E-4	3.5E-2	2.4E-1
Background (b)		1.5E-2	8.6E-1
Soil standards	75	75	

NOTE: Negative values indicate concentrations at or near background levels of radioactivity.
(a) Not analyzed for this radionuclide
(b) Derived from PNL 1988 data (PNL 1989). Background numbers represent mean + 2 SE.

Table E-2. Grid Site Soil Results for 200 West Area for 1988 (pCi/g dry weight). (Sheet 1 of 3)

Location	Mn-54 ± Error	Co-60 ± Error	Sr-90 ± Error	Nb-95 ± Error	Zr-95 ± Error
2W 2	1.3E-2 ± 1.3E-2	< -4.6E-3 ± 1.6E-2	9.1E-1 ± 1.7E-1	< -3.2E-2 ± 1.8E-2	< 3.7E-3 ± 2.6E-2
2W 3	< 1.7E-2 ± 1.7E-2	< -1.5E-3 ± 1.7E-2	3.3E-1 ± 6.4E-2	< 3.9E-3 ± 2.2E-2	< 2.0E-2 ± 3.1E-2
2W 4	< 1.8E-2 ± 1.8E-2	< 2.3E-3 ± 1.7E-2	4.0E-1 ± 7.7E-2	< -3.4E-3 ± 2.2E-2	< 1.2E-2 ± 3.1E-2
2W 5	< 1.2E-2 ± 1.7E-2	< 2.9E-3 ± 1.8E-2	2.7E-1 ± 5.3E-2	< -2.9E-2 ± 2.4E-2	< 1.1E-2 ± 3.0E-2
2W 6	< 7.4E-4 ± 1.6E-2	< -3.6E-3 ± 1.7E-2	7.1E-2 ± 1.6E-2	< -2.8E-2 ± 1.9E-2	< -2.0E-2 ± 2.6E-2
2W 7	< 3.7E-3 ± 1.4E-2	< 5.9E-3 ± 1.5E-2	2.1E-1 ± 4.2E-2	< -1.3E-2 ± 1.7E-2	< 5.5E-3 ± 2.5E-2
2W 8	< 2.0E-3 ± 1.8E-2	1.5E-1 ± 3.8E-2	1.1E+0 ± 2.3E-1	< -2.6E-2 ± 2.2E-2	< -3.6E-3 ± 3.1E-2
2W 9	< 1.2E-2 ± 1.6E-2	< -1.8E-2 ± 2.1E-2	2.1E+0 ± 3.9E-1	< -1.6E-2 ± 1.9E-2	< 2.0E-2 ± 2.9E-2
2W10	< 1.3E-3 ± 1.4E-2	< 1.2E-2 ± 1.5E-2	3.8E-1 ± 7.4E-2	< -2.0E-2 ± 1.8E-2	< 1.8E-2 ± 2.3E-2
2W12	1.8E-2 ± 1.5E-2	< -1.2E-2 ± 2.3E-2	1.9E-1 ± 3.8E-2	< -1.8E-2 ± 1.8E-2	< 3.3E-3 ± 2.5E-2
2W13	2.3E-2 ± 1.4E-2	< 6.3E-4 ± 1.4E-2	1.5E+0 ± 2.8E-1	< -2.8E-2 ± 1.9E-2	< 3.5E-3 ± 2.6E-2
2W14	< -8.0E-4 ± 1.6E-2	3.2E-2 ± 2.0E-2	2.7E-1 ± 5.3E-2	< -1.7E-3 ± 2.1E-2	3.6E-2 ± 2.9E-2
2W15	< -6.5E-3 ± 1.8E-2	< 1.1E-2 ± 1.8E-2	1.1E+0 ± 2.0E-1	< -9.2E-3 ± 2.2E-2	< 1.9E-2 ± 3.2E-2
2W16	< 3.5E-3 ± 1.4E-2	< -6.8E-3 ± 1.6E-2	2.5E-1 ± 5.0E-2	< 2.3E-3 ± 1.7E-2	< 1.3E-2 ± 2.2E-2
2W17	< -3.6E-3 ± 1.5E-2	< 1.9E-3 ± 1.4E-2	1.4E-1 ± 2.7E-2	< -1.7E-2 ± 1.6E-2	< 8.2E-3 ± 2.4E-2
2W18	< 2.4E-3 ± 1.4E-2	< 2.6E-4 ± 1.5E-2	1.5E-1 ± 3.1E-2	< -8.8E-3 ± 1.7E-2	< -1.7E-3 ± 2.7E-2
2W19	< 1.9E-3 ± 1.5E-2	< 1.7E-2 ± 1.8E-2	5.0E-1 ± 1.0E-1	< -3.2E-2 ± 1.8E-2	< 1.4E-3 ± 2.8E-2
2W20	< -5.2E-3 ± 1.7E-2	< -1.0E-2 ± 1.7E-2	9.5E-1 ± 1.8E-1	< -9.1E-3 ± 2.3E-2	< 1.6E-2 ± 3.2E-2
2W21	< 3.4E-3 ± 1.2E-2	< 4.0E-3 ± 1.1E-2	1.9E-1 ± 3.7E-2	< -2.7E-2 ± 1.7E-2	< 8.1E-3 ± 2.4E-2
2W22	< -2.4E-3 ± 1.6E-2	< -1.1E-2 ± 1.8E-2	4.6E-1 ± 8.7E-2	< -1.7E-2 ± 1.9E-2	3.4E-2 ± 2.9E-2
2W23	< -3.6E-3 ± 1.6E-2	4.0E-2 ± 1.7E-2	1.5E+0 ± 3.0E-1	< -5.4E-3 ± 1.9E-2	< 2.1E-2 ± 2.8E-2
2W24	1.9E-2 ± 1.6E-2	1.7E-2 ± 1.4E-2	2.8E-1 ± 5.5E-2	< 7.3E-3 ± 2.0E-2	< -6.1E-3 ± 2.9E-2
2W25	< 1.4E-2 ± 1.7E-2	< -2.7E-2 ± 1.8E-2	1.9E-1 ± 3.8E-2	< -1.1E-2 ± 2.1E-2	< -6.0E-3 ± 3.2E-2
2W26	< 5.6E-3 ± 1.5E-2	< 1.0E-2 ± 1.5E-2	1.9E-1 ± 3.8E-2	1.6E-2 ± 1.1E-2	< 1.8E-2 ± 2.7E-2
2W27	< -4.2E-3 ± 1.4E-2	< -1.9E-2 ± 1.8E-2	6.2E-1 ± 1.2E-1	< -2.4E-3 ± 1.7E-2	< 1.5E-2 ± 2.5E-2
2W28	< -8.5E-5 ± 1.4E-2	< 3.6E-3 ± 1.4E-2	1.6E+0 ± 3.0E-1	< -2.0E-2 ± 1.6E-2	< -7.5E-3 ± 2.5E-2
2W29	< 7.9E-3 ± 1.6E-2	< 6.7E-3 ± 1.7E-2	8.1E-1 ± 1.5E-1	< -1.3E-2 ± 2.2E-2	< 2.6E-2 ± 3.1E-2
2W30	< 8.4E-3 ± 1.9E-2	< -1.8E-4 ± 2.2E-2	3.1E-1 ± 6.1E-2	< 5.6E-3 ± 2.3E-2	< 2.0E-2 ± 3.5E-2
2W31	< 6.9E-3 ± 1.7E-2	< 7.7E-3 ± 1.7E-2	3.0E-1 ± 5.9E-2	< -1.4E-2 ± 2.2E-2	< 2.8E-2 ± 3.1E-2
2W32	< 3.7E-3 ± 1.6E-2	< -9.8E-3 ± 1.6E-2	3.2E-1 ± 6.1E-2	< -3.1E-2 ± 2.1E-2	< 1.4E-2 ± 2.6E-2
2W33	< 1.3E-2 ± 1.8E-2	< 1.5E-2 ± 1.8E-2	4.9E-1 ± 9.3E-2	< -1.3E-2 ± 2.4E-2	< -2.5E-2 ± 3.6E-2
2W34	< 8.4E-4 ± 1.5E-2	2.3E-2 ± 1.5E-2	6.1E-1 ± 1.2E-1	< -2.0E-2 ± 1.6E-2	< -4.4E-4 ± 2.5E-2
2W35	< 1.2E-3 ± 1.7E-2	< 1.3E-2 ± 1.4E-2	2.6E-1 ± 5.0E-2	< 9.0E-3 ± 2.1E-2	< 1.3E-2 ± 2.9E-2
2WA	1.7E-2 ± 1.6E-2	< -3.5E-3 ± 1.7E-2	2.0E-1 ± 3.9E-2	< -1.1E-2 ± 2.0E-2	< -2.7E-2 ± 3.1E-2
2WB	< -3.8E-3 ± 1.4E-2	< -2.0E-3 ± 1.5E-2	3.3E-1 ± 6.3E-2	< -2.6E-2 ± 2.0E-2	< 7.3E-3 ± 2.6E-2
2WC	< 3.0E-3 ± 1.3E-2	< -1.1E-3 ± 1.3E-2	2.8E-1 ± 5.5E-2	< -1.2E-2 ± 1.6E-2	< 4.0E-3 ± 2.1E-2
2WD	< 4.2E-3 ± 1.7E-2	< -3.9E-3 ± 1.5E-2	2.7E-1 ± 5.2E-2	< -2.7E-2 ± 2.1E-2	< -1.3E-2 ± 2.7E-2
2WE	< 1.3E-2 ± 1.6E-2	< -3.3E-3 ± 1.6E-2	2.5E-1 ± 4.8E-2	< 5.5E-4 ± 1.9E-2	< -2.5E-2 ± 3.2E-2
2WF	< 2.9E-3 ± 1.3E-2	< 1.3E-3 ± 1.2E-2	1.1E-1 ± 2.2E-2	< -2.2E-2 ± 1.6E-2	< 1.0E-2 ± 2.4E-2
Maximum	2.3E-2	1.5E-1	2.1E+0	1.6E-2	3.6E-2
Minimum	-6.5E-3	-2.7E-2	7.1E-2	-3.2E-2	-2.7E-2
Mean	5.7E-3	6.2E-3	5.2E-1	-1.3E-2	7.0E-3
Background (a)			2.0E-1		
Soil standards		5,000	600		

Table E-2. Grid Site Soil Results for 200 West Area for 1988 (pCi/g dry weight). (Sheet 2 of 3)

Location	Ru-106 ± Error	Cs-137 ± Error	Eu-152 ± Error	Eu-154 ± Error	Eu-155 ± Error
2W 2	< 6.1E-2 ± 1.5E-1	6.4E+0 ± 6.5E-1	< 5.9E-2 ± 7.1E-2	< -2.3E-2 ± 4.7E-2	< 5.5E-2 ± 6.3E-2
2W 3	< 0.0E+0 ± 1.5E-1	1.3E+0 ± 1.4E-1	9.8E-2 ± 8.1E-2	< 1.8E-2 ± 6.1E-2	< 2.6E-2 ± 6.1E-2
2W 4	< -8.2E-2 ± 1.6E-1	1.7E+0 ± 1.8E-1	1.3E-1 ± 8.2E-2	< -4.0E-2 ± 6.1E-2	< 4.7E-2 ± 6.3E-2
2W 5	< 2.3E-2 ± 1.5E-1	1.1E+0 ± 1.2E-1	9.8E-2 ± 8.6E-2	< -3.4E-2 ± 6.3E-2	< 4.4E-2 ± 6.3E-2
2W 6	< 2.8E-2 ± 1.2E-1	1.2E-1 ± 2.6E-2	1.1E-1 ± 7.5E-2	< -6.8E-2 ± 5.6E-2	6.3E-2 ± 5.9E-2
2W 7	< -4.6E-2 ± 1.3E-1	2.4E+0 ± 2.6E-1	< 3.3E-2 ± 7.2E-2	< 3.6E-3 ± 5.2E-2	< 4.7E-2 ± 5.4E-2
2W 8	< -2.6E-1 ± 3.5E-1	4.5E+1 ± 4.6E+0	< 7.9E-2 ± 8.2E-2	< -2.9E-2 ± 5.8E-2	< -3.2E-2 ± 1.4E-1
2W 9	< -7.3E-2 ± 1.6E-1	6.1E+0 ± 6.2E-1	< 5.9E-2 ± 7.6E-2	< -8.2E-3 ± 5.7E-2	< 5.3E-2 ± 8.1E-2
2W10	< -3.8E-2 ± 1.3E-1	1.5E+0 ± 1.6E-1	6.9E-2 ± 6.5E-2	< -2.8E-2 ± 5.1E-2	< 4.9E-2 ± 5.0E-2
2W12	< 4.0E-2 ± 1.4E-1	1.2E+0 ± 1.3E-1	9.2E-2 ± 8.7E-2	< 2.9E-3 ± 3.8E-2	< 7.3E-2 ± 7.4E-2
2W13	< 1.3E-1 ± 2.0E-1	1.7E+1 ± 1.7E+0	8.2E-2 ± 6.7E-2	< -1.0E-3 ± 4.9E-2	< 3.2E-2 ± 7.9E-2
2W14	< 3.7E-2 ± 1.5E-1	3.4E+0 ± 3.5E-1	1.4E-1 ± 8.4E-2	< -2.2E-2 ± 5.2E-2	< 4.3E-2 ± 6.4E-2
2W15	< -1.3E-1 ± 1.8E-1	3.2E+0 ± 3.4E-1	< 7.6E-2 ± 7.9E-2	< -1.2E-2 ± 6.0E-2	< 3.4E-2 ± 7.5E-2
2W16	< -1.9E-2 ± 8.4E-2	3.8E-1 ± 4.9E-2	9.5E-2 ± 6.1E-2	< 1.9E-2 ± 4.2E-2	< 5.0E-3 ± 5.1E-2
2W17	< 4.5E-2 ± 1.1E-1	3.0E-1 ± 4.0E-2	< 2.1E-2 ± 5.9E-2	< 1.4E-2 ± 4.6E-2	< 3.7E-2 ± 4.7E-2
2W18	< -3.4E-3 ± 1.3E-1	1.5E+0 ± 1.6E-1	9.9E-2 ± 7.7E-2	< 1.7E-2 ± 5.0E-2	< 1.3E-2 ± 5.1E-2
2W19	< -4.8E-2 ± 1.8E-1	8.3E+0 ± 8.5E-1	1.0E-1 ± 6.6E-2	< -1.9E-3 ± 5.2E-2	7.7E-2 ± 6.8E-2
2W20	< 1.2E-2 ± 1.4E-1	1.2E+0 ± 1.4E-1	1.3E-1 ± 8.9E-2	< -2.9E-2 ± 5.4E-2	7.8E-2 ± 6.2E-2
2W21	< -7.2E-2 ± 1.2E-1	7.9E-1 ± 9.0E-2	9.4E-2 ± 6.7E-2	< -2.1E-2 ± 4.8E-2	< 3.2E-2 ± 4.9E-2
2W22	< 1.7E-2 ± 1.4E-1	1.0E+0 ± 1.1E-1	8.3E-2 ± 7.6E-2	< 1.8E-2 ± 5.1E-2	< 4.5E-2 ± 5.7E-2
2W23	< -2.0E-2 ± 4.0E-1	6.5E+1 ± 6.5E+0	< 4.1E-2 ± 6.7E-2	< 3.4E-2 ± 5.8E-2	< -5.6E-3 ± 1.8E-1
2W24	< -2.8E-2 ± 1.3E-1	1.3E+0 ± 1.4E-1	1.4E-1 ± 6.7E-2	< -7.4E-3 ± 5.3E-2	7.2E-2 ± 5.8E-2
2W25	< 3.1E-2 ± 1.0E-1	5.3E-1 ± 6.7E-2	< 7.0E-2 ± 7.3E-2	< 3.8E-2 ± 5.2E-2	< 6.7E-3 ± 6.0E-2
2W26	< -4.6E-2 ± 1.4E-1	3.1E-1 ± 4.4E-2	1.1E-1 ± 6.8E-2	< -6.8E-3 ± 5.2E-2	5.4E-2 ± 5.1E-2
2W27	< -4.9E-2 ± 1.4E-1	4.1E+0 ± 4.2E-1	7.9E-2 ± 7.2E-2	< 4.5E-3 ± 4.7E-2	< 1.6E-2 ± 4.8E-2
2W28	< 2.2E-2 ± 1.4E-1	5.3E+0 ± 5.4E-1	1.0E-1 ± 6.6E-2	< 4.1E-3 ± 4.7E-2	< 5.4E-2 ± 5.4E-2
2W29	< -7.5E-2 ± 1.2E-1	1.4E+0 ± 1.5E-1	1.1E-1 ± 6.8E-2	< 2.5E-2 ± 5.1E-2	6.8E-2 ± 5.8E-2
2W30	< 8.3E-3 ± 1.5E-1	7.7E-1 ± 9.3E-2	1.1E-1 ± 9.3E-2	< -1.7E-2 ± 6.9E-2	< 3.2E-2 ± 7.8E-2
2W31	< 6.8E-2 ± 1.3E-1	1.2E+0 ± 1.4E-1	1.2E-1 ± 7.0E-2	< -1.2E-2 ± 6.0E-2	< 2.3E-2 ± 6.8E-2
2W32	< 2.7E-2 ± 1.3E-1	6.6E-1 ± 7.9E-2	1.4E-1 ± 6.7E-2	< 2.5E-2 ± 5.5E-2	7.2E-2 ± 5.5E-2
2W33	< 2.2E-2 ± 1.6E-1	1.7E+0 ± 1.8E-1	< 2.1E-2 ± 9.3E-2	9.8E-2 ± 6.3E-2	< 5.9E-3 ± 8.0E-2
2W34	< 3.4E-2 ± 1.2E-1	9.1E-1 ± 1.0E-1	1.4E-1 ± 7.2E-2	< 1.4E-2 ± 4.7E-2	< 4.3E-2 ± 4.5E-2
2W35	< -1.3E-1 ± 1.2E-1	1.1E+0 ± 1.2E-1	1.6E-1 ± 6.9E-2	< 5.3E-2 ± 5.4E-2	< 4.8E-2 ± 5.7E-2
2WA	1.5E-1 ± 1.2E-1	4.2E-1 ± 5.3E-2	8.5E-2 ± 7.0E-2	< -2.4E-2 ± 5.7E-2	6.5E-2 ± 6.0E-2
2WB	< 2.7E-2 ± 1.3E-1	6.7E-1 ± 7.8E-2	7.8E-2 ± 6.9E-2	< -7.7E-3 ± 5.1E-2	< 3.1E-2 ± 5.3E-2
2WC	< -1.1E-2 ± 1.2E-1	5.8E-1 ± 6.8E-2	< 4.1E-2 ± 6.5E-2	< -3.2E-2 ± 4.9E-2	< 3.0E-2 ± 3.9E-2
2WD	< 8.3E-3 ± 1.3E-1	7.3E-1 ± 8.4E-2	< 3.9E-2 ± 8.4E-2	< -2.1E-2 ± 5.9E-2	< 1.6E-2 ± 4.7E-2
2WE	< 5.3E-2 ± 1.1E-1	5.8E-1 ± 7.3E-2	7.7E-2 ± 6.7E-2	< -2.7E-2 ± 5.7E-2	< 4.2E-2 ± 5.5E-2
2WF	< 2.7E-2 ± 1.1E-1	2.5E-1 ± 4.0E-2	1.0E-1 ± 6.2E-2	< -4.6E-2 ± 5.0E-2	5.1E-2 ± 4.4E-2
Maximum	1.5E-1	6.5E+1	1.6E-1	9.8E-2	7.8E-2
Minimum	-2.6E-1	1.2E-1	2.1E-2	-6.8E-2	-3.2E-2
Mean	-6.3E-3	4.9E+0	9.0E-2	-3.4E-3	4.0E-2
Background (a)		7.7E-1			
Soil standards		20,000	3,000	3,000	20,000

Table E-2. Grid Site Soil Results for 200 West Area for 1988 (pCi/g dry weight). (Sheet 3 of 3)

Location	Pb-214 ± Error	Pu-238 ± Error	Pu-239 ± Error	U-Total ± Error
2W 2	6.0E-1 ± 8.8E-2	1.7E-3 ± 4.1E-4	7.9E-1 ± 7.0E-2	3.0E-1 ± 9.2E-2
2W 3	6.2E-1 ± 8.5E-2	1.0E-3 ± 3.1E-4	6.7E-2 ± 6.8E-3	2.5E-1 ± 8.0E-2
2W 4	6.6E-1 ± 9.1E-2	9.5E-4 ± 3.0E-4	6.8E-2 ± 7.0E-3	2.1E-1 ± 6.8E-2
2W 5	7.8E-1 ± 1.0E-1	1.4E-3 ± 5.1E-4	7.9E-2 ± 9.3E-3	3.1E-1 ± 9.5E-2
2W 6	5.6E-1 ± 7.7E-2	< 7.0E-5 ± 8.7E-5	5.2E-3 ± 8.4E-4	2.8E-1 ± 8.6E-2
2W 7	5.4E-1 ± 7.6E-2	1.2E-3 ± 3.4E-4	4.4E-2 ± 4.7E-3	2.5E-1 ± 7.9E-2
2W 8	4.9E-1 ± 1.3E-1	5.7E-3 ± 8.9E-4	1.1E-1 ± 1.1E-2	2.6E-1 ± 8.0E-2
2W 9	5.4E-1 ± 8.8E-2	2.2E-2 ± 2.5E-3	2.4E+0 ± 2.3E-1	2.6E-1 ± 8.2E-2
2W10	6.6E-1 ± 8.6E-2	2.7E-3 ± 5.7E-4	3.0E-1 ± 3.0E-2	3.2E-1 ± 1.0E-1
2W12	5.3E-1 ± 8.0E-2	1.2E-3 ± 3.4E-4	4.3E-2 ± 4.6E-3	2.6E-1 ± 8.2E-2
2W13	6.3E-1 ± 9.9E-2	1.9E-3 ± 4.2E-4	9.8E-2 ± 9.8E-3	3.0E-1 ± 9.1E-2
2W14	6.5E-1 ± 8.9E-2	3.6E-3 ± 6.8E-4	2.9E-1 ± 2.9E-2	3.3E-1 ± 1.0E-1
2W15	7.6E-1 ± 1.0E-1	5.9E-3 ± 9.3E-4	6.5E-1 ± 6.4E-2	4.9E-1 ± 1.5E-1
2W16	4.7E-1 ± 6.6E-2	6.7E-4 ± 2.7E-4	2.5E-2 ± 3.0E-3	3.5E-1 ± 1.1E-1
2W17	4.8E-1 ± 6.6E-2	3.1E-3 ± 6.2E-4	1.0E-1 ± 1.1E-2	2.6E-1 ± 8.1E-2
2W18	5.7E-1 ± 7.7E-2	1.2E-2 ± 1.5E-3	6.9E-1 ± 6.7E-2	3.0E-1 ± 9.3E-2
2W19	6.3E-1 ± 9.0E-2	9.0E-3 ± 1.3E-3	4.5E-1 ± 4.5E-2	4.2E-1 ± 1.3E-1
2W20	6.9E-1 ± 9.1E-2	2.0E-3 ± 5.1E-4	1.4E-1 ± 1.4E-2	3.4E-1 ± 1.0E-1
2W21	5.6E-1 ± 7.7E-2	1.2E-3 ± 3.5E-4	3.2E-2 ± 3.5E-3	2.7E-1 ± 8.5E-2
2W22	6.5E-1 ± 8.6E-2	2.4E-3 ± 5.2E-4	7.2E-2 ± 7.5E-3	3.5E-1 ± 1.1E-1
2W23	6.9E-1 ± 1.5E-1	2.5E-2 ± 2.9E-3	1.4E+0 ± 1.3E-1	4.2E-1 ± 1.3E-1
2W24	6.4E-1 ± 8.4E-2	1.3E-3 ± 4.2E-4	4.6E-2 ± 5.3E-3	8.3E-1 ± 2.4E-1
2W25	5.7E-1 ± 8.3E-2	5.2E-4 ± 2.7E-4	2.1E-2 ± 2.7E-3	5.9E-1 ± 1.7E-1
2W26	6.0E-1 ± 7.7E-2	8.6E-4 ± 3.1E-4	2.4E-2 ± 2.7E-3	2.4E-1 ± 7.4E-2
2W27	5.5E-1 ± 7.8E-2	2.8E-3 ± 6.0E-4	6.9E-2 ± 7.3E-3	3.7E-1 ± 1.1E-1
2W28	4.8E-1 ± 7.1E-2	1.8E-3 ± 4.6E-4	3.5E-2 ± 4.0E-3	2.7E-1 ± 8.2E-2
2W29	6.5E-1 ± 8.9E-2	5.0E-3 ± 9.1E-4	1.2E-1 ± 1.3E-2	3.1E-1 ± 9.4E-2
2W30	6.7E-1 ± 9.2E-2	2.0E-3 ± 5.5E-4	4.1E-2 ± 4.9E-3	5.9E-1 ± 1.7E-1
2W31	5.7E-1 ± 8.1E-2	6.1E-3 ± 1.1E-3	2.4E-1 ± 2.6E-2	2.0E-1 ± 6.6E-2
2W32	6.5E-1 ± 8.3E-2	1.0E-3 ± 4.5E-4	4.3E-2 ± 5.1E-3	2.6E-1 ± 8.1E-2
2W33	6.4E-1 ± 9.3E-2	2.8E-3 ± 6.5E-4	1.4E-1 ± 1.5E-2	3.5E-1 ± 1.1E-1
2W34	5.4E-1 ± 7.3E-2	3.9E-1 ± 3.9E-2	1.7E-1 ± 1.7E-2	2.4E-1 ± 7.7E-2
2W35	6.3E-1 ± 8.6E-2	3.0E-3 ± 6.1E-4	8.6E-2 ± 9.0E-3	2.9E-1 ± 9.0E-2
2WA	6.8E-1 ± 8.6E-2	1.0E-3 ± 3.5E-4	3.8E-2 ± 4.4E-3	2.1E-1 ± 6.7E-2
2WB	6.0E-1 ± 7.9E-2	1.4E-3 ± 4.7E-4	2.4E-2 ± 2.9E-3	3.0E-1 ± 9.4E-2
2WC	5.3E-1 ± 7.1E-2	7.9E-4 ± 3.2E-4	3.2E-2 ± 3.7E-3	3.4E-1 ± 1.0E-1
2WD	6.3E-1 ± 8.3E-2	1.3E-3 ± 3.8E-4	4.8E-2 ± 5.3E-3	2.8E-1 ± 8.6E-2
2WE	5.3E-1 ± 7.5E-2	6.4E-4 ± 2.8E-4	1.8E-2 ± 2.2E-3	2.9E-1 ± 8.9E-2
2WF	5.0E-1 ± 7.1E-2	< 1.9E-4 ± 2.4E-4	7.7E-3 ± 1.8E-3	1.4E-1 ± 4.8E-2
Maximum	7.8E-1	3.9E-1	2.4E+0	8.3E-1
Minimum	4.7E-1	7.0E-5	5.2E-3	1.4E-1
Mean	6.0E-1	1.3E-2	2.3E-1	3.2E-1
Background (a)			1.5E-2	8.6E-1
Soil standards		75	75	

NOTE: Negative values indicate concentrations at or near background levels of radioactivity.
(a) Derived from PNL 1988 data (PNL 1989). Background numbers represent mean + 2 SE.

Table E-3. Soil Results for 200 Area Fencelines for 1988 (pCi/g dry weight). (Sheet 1 of 2)

Location	Mn-54 ± Error	Sr-90 ± Error	Zr-95 ± Error	Ru-106 ± Error	Cs-134 ± Error	Cs-137 ± Error	Ce-141 ± Error
200 East Area							
2E-1	< 1.9E-3 ± 1.5E-2	5.2E-1 ± 9.8E-2	< -8.7E-3 ± 2.6E-2	< 2.2E-2 ± 1.2E-1	< 7.3E-3 ± 1.2E-2	1.5E+0 ± 1.6E-1	< 1.2E-2 ± 2.6E-2
2E-2	< 7.7E-3 ± 1.4E-2	2.1E+0 ± 3.9E-1	< 6.8E-3 ± 2.5E-2	< 1.2E-1 ± 2.0E-1	< 1.8E-2 ± 1.9E-2	1.5E+1 ± 1.5E+0	< 2.2E-3 ± 3.7E-2
2E-3	< 9.3E-3 ± 1.5E-2	2.5E-1 ± 4.8E-2	< -1.6E-2 ± 2.8E-2	2.3E-1 ± 1.4E-1	2.5E-2 ± 1.4E-2	7.8E-1 ± 8.9E-2	< 7.5E-3 ± 2.6E-2
2E-N	< 6.4E-3 ± 1.8E-2	1.1E+0 ± 2.1E-1	< 3.5E-3 ± 3.4E-2	< 6.2E-2 ± 2.0E-1	< 1.4E-2 ± 2.0E-2	1.2E+1 ± 1.2E+0	< -7.6E-3 ± 3.6E-2
2E-NE	< 1.6E-2 ± 1.9E-2	2.2E+0 ± 4.2E-1	< 2.4E-3 ± 4.1E-2	< -2.7E-2 ± 2.0E-1	< -3.0E-3 ± 2.1E-2	1.7E+0 ± 1.9E-1	< -2.0E-3 ± 3.1E-2
2E-SE	< 1.2E-2 ± 1.5E-2	3.8E-1 ± 7.4E-2	< 1.2E-2 ± 2.8E-2	< -2.3E-2 ± 1.3E-1	< -6.7E-2 ± 1.8E-2	1.0E-1 ± 2.4E-2	< 9.3E-3 ± 2.3E-2
A-TF-E1	< 4.8E-4 ± 1.3E-2	4.7E-1 ± 9.1E-2	< -6.1E-3 ± 2.6E-2	< -1.7E-2 ± 1.2E-1	< -2.0E-3 ± 1.4E-2	3.7E+0 ± 3.8E-1	< -1.1E-3 ± 2.5E-2
A-TF-E2	< 1.2E-3 ± 1.6E-2	7.2E-1 ± 1.4E-1	< 1.0E-3 ± 2.8E-2	1.7E-1 ± 1.5E-1	2.5E-2 ± 1.6E-2	4.2E+0 ± 4.4E-1	< 8.4E-4 ± 3.0E-2
A-TF-E3	< 2.1E-2 ± 2.7E-2	2.1E+0 ± 3.9E-1	< -1.7E-1 ± 4.1E-1	< 6.3E-2 ± 2.9E-1	< 9.1E-3 ± 2.2E-2	1.3E+1 ± 1.3E+0	< 2.6E+0 ± 7.3E+0
A-TF-E4	< 1.4E-2 ± 1.5E-2	4.1E+0 ± 7.7E-1	< 2.6E-2 ± 2.8E-2	< 1.3E-1 ± 2.0E-1	< -5.9E-2 ± 2.5E-2	1.0E+1 ± 1.0E+0	< -4.3E-3 ± 3.7E-2
A-TF-W1	2.2E-2 ± 1.6E-2	9.5E-1 ± 1.8E-1	< 1.7E-2 ± 2.6E-2	1.8E-1 ± 1.4E-1	< -5.0E-2 ± 1.9E-2	1.9E+0 ± 2.0E-1	< -3.5E-2 ± 2.7E-2
A-TF-W2	2.4E-2 ± 1.7E-2	7.6E+0 ± 1.4E+0	< 2.8E-2 ± 3.2E-2	< 3.4E-2 ± 2.6E-1	< -1.6E-2 ± 2.6E-2	1.2E+1 ± 1.2E+0	< 1.5E-3 ± 3.9E-2
AW-TF-E	< 1.1E-2 ± 2.4E-2	6.1E-1 ± 1.2E-1	< -2.0E-3 ± 5.2E-2	< -1.9E-1 ± 2.6E-1	< -2.3E-2 ± 2.8E-2	6.9E-1 ± 9.5E-2	< -2.0E-2 ± 4.2E-2
B-TF-NE	< 1.6E-2 ± 2.2E-2	6.3E+0 ± 1.2E+0	< -1.2E-2 ± 4.1E-2	< -4.4E-1 ± 9.5E-1	< 9.7E-3 ± 8.8E-2	1.9E+2 ± 1.9E+1	< -8.0E-2 ± 1.3E-1
B-TF-SE	< 1.2E-3 ± 1.3E-2	1.1E+1 ± 2.1E+0	< -2.2E-3 ± 2.6E-2	< -1.9E-1 ± 2.8E-1	< -4.3E-3 ± 2.9E-2	3.8E+1 ± 3.8E+0	< -4.4E-3 ± 5.2E-2
BX-TF-W	< 1.0E-2 ± 1.6E-2	4.0E-1 ± 7.8E-2	< 1.5E-2 ± 3.1E-2	< 4.0E-2 ± 1.6E-1	< -4.7E-2 ± 1.9E-2	2.5E+0 ± 2.7E-1	< 6.5E-3 ± 3.0E-2
C-TF-NE	< 6.7E-3 ± 1.4E-2	2.8E+0 ± 5.3E-1	< 6.7E-3 ± 2.9E-2	< 5.5E-2 ± 1.7E-1	< 1.6E-2 ± 1.8E-2	1.0E+1 ± 1.0E+0	< 6.3E-3 ± 3.4E-2
C-TF-SE	< -4.3E-4 ± 1.5E-2	3.4E+0 ± 6.4E-1	< 1.5E-2 ± 2.7E-2	< 2.0E-3 ± 1.4E-1	< -5.9E-2 ± 2.0E-2	3.7E+0 ± 3.8E-1	< -2.6E-2 ± 2.8E-2
Maximum	2.4E-2	1.1E+1	2.8E-2	2.3E-1	2.5E-2	1.9E+2	2.6E+0
Minimum	-4.3E-4	2.5E-1	-1.7E-1	-4.4E-1	-6.7E-2	1.0E-1	-8.0E-2
200 West Area							
2WN	< 8.6E-3 ± 1.3E-2	5.0E-2 ± 1.2E-2	< -1.3E-2 ± 2.4E-2	< -2.9E-2 ± 1.1E-1	< -2.4E-3 ± 1.1E-2	1.3E-1 ± 2.7E-2	< 1.4E-2 ± 2.2E-2
2WNE	< 4.0E-3 ± 1.7E-2	2.5E-1 ± 4.9E-2	3.3E-2 ± 3.0E-2	< -3.7E-2 ± 1.3E-1	< -6.5E-2 ± 1.9E-2	2.4E-1 ± 3.9E-2	< -6.9E-3 ± 2.5E-2
2WSE	< 4.4E-3 ± 1.7E-2	1.6E-1 ± 3.2E-2	< 7.1E-3 ± 3.1E-2	< -9.6E-3 ± 1.4E-1	< -5.4E-2 ± 2.0E-2	3.7E-1 ± 5.2E-2	< -9.1E-3 ± 2.6E-2
S-TF-NE	< 8.1E-3 ± 1.9E-2	1.9E+0 ± 3.6E-1	< -7.8E-3 ± 3.4E-2	< -1.6E-2 ± 1.8E-1	< 9.9E-3 ± 2.0E-2	4.2E+0 ± 4.3E-1	< -2.4E-3 ± 3.4E-2
S-TF-SE	< 6.8E-3 ± 1.7E-2	9.8E+0 ± 1.8E+0	< 2.8E-2 ± 3.0E-2	< -4.0E-1 ± 3.0E-1	< 1.8E-3 ± 2.9E-2	3.7E+1 ± 3.8E+0	< 4.4E-2 ± 5.7E-2
S-TF-W	< -8.0E-3 ± 1.6E-2	7.4E-1 ± 1.4E-1	< 1.6E-2 ± 3.1E-2	< 2.7E-2 ± 1.9E-1	< 5.2E-3 ± 1.9E-2	3.3E+0 ± 3.4E-1	< 5.0E-3 ± 2.9E-2
TX-TF-NE	< -1.5E-3 ± 1.5E-2	7.5E-1 ± 1.4E-1	< 8.9E-3 ± 3.0E-2	< -7.7E-3 ± 1.7E-1	< -6.9E-2 ± 2.1E-2	4.6E+0 ± 4.7E-1	< 1.1E-2 ± 3.2E-2
TX-TF-W	< 5.3E-3 ± 1.5E-2	4.0E-1 ± 7.7E-2	< 7.7E-3 ± 2.9E-2	< 9.7E-2 ± 1.5E-1	< -6.2E-2 ± 2.1E-2	4.9E+0 ± 5.0E-1	< -2.8E-3 ± 2.9E-2
U-TF-NE (a)	b	5.1E+1	b	b	b	3.0E+2	b
U-TF-SE	1.8E-2 ± 1.5E-2	1.5E+0 ± 2.8E-1	< 2.7E-2 ± 2.9E-2	< 5.5E-2 ± 1.9E-1	< 8.3E-3 ± 1.9E-2	1.4E+1 ± 1.4E+0	5.7E-2 ± 3.9E-2
U-TF-W	< 1.1E-2 ± 1.1E-2	4.0E-1 ± 7.6E-2	< 4.9E-3 ± 2.2E-2	< -7.0E-2 ± 1.1E-1	1.3E-2 ± 1.2E-2	1.4E+0 ± 1.5E-1	< -1.4E-3 ± 2.2E-2
Maximum	1.8E-2	5.1E+1	3.3E-2	9.7E-2	1.3E-2	3.0E+2	5.7E-2
Minimum	-8.0E-3	5.0E-2	-1.3E-2	-4.0E-1	-6.9E-2	1.3E-1	-9.1E-3
Soil Standards		600			10,000	20,000	

Table E-3. Soil Results for 200 Area Fencelines for 1988 (pCi/g dry weight). (Sheet 2 of 2)

Location	Eu-152 ± Error	Eu-154 ± Error	Eu-155 ± Error	Pu-238 ± Error	Pu-239 ± Error	Uranium ± Error
200 East Area						
2E-1	7.6E-2 ± 6.4E-2	< 1.1E-2 ± 4.9E-2	< 3.0E-2 ± 5.2E-2	< -1.6E-5 ± 9.2E-5	1.6E-3 ± 4.8E-4	1.3E-1 ± 4.8E-2
2E-2	8.5E-2 ± 8.1E-2	< -6.5E-4 ± 4.8E-2	< 5.4E-2 ± 7.5E-2	< -3.2E-5 ± 3.3E-4	4.3E-3 ± 1.5E-3	3.3E-1 ± 1.0E-1
2E-3	7.2E-2 ± 5.7E-2	< 1.8E-2 ± 4.4E-2	5.5E-2 ± 5.3E-2	3.5E-4 ± 1.9E-4	1.3E-2 ± 1.7E-3	3.2E-1 ± 1.0E-1
2E-N	< 8.3E-2 ± 9.1E-2	< 6.5E-3 ± 5.4E-2	< 4.4E-2 ± 7.7E-2	< -3.2E-5 ± 4.0E-4	4.3E-3 ± 1.6E-3	8.7E-2 ± 3.5E-2
2E-NE	< 8.0E-2 ± 9.6E-2	< 1.8E-2 ± 6.6E-2	< 6.8E-2 ± 7.3E-2	< 2.2E-4 ± 2.4E-4	6.5E-3 ± 1.5E-3	2.3E-1 ± 7.4E-2
2E-SE	< 3.7E-2 ± 8.1E-2	< -1.8E-2 ± 5.5E-2	< 3.6E-2 ± 5.1E-2	< 1.8E-4 ± 1.9E-4	1.9E-3 ± 5.5E-4	2.9E-1 ± 9.3E-2
A-TF-E1	8.3E-2 ± 6.9E-2	< -3.2E-2 ± 4.6E-2	8.2E-2 ± 5.5E-2	< 7.5E-5 ± 1.1E-4	3.1E-3 ± 6.2E-4	1.4E-1 ± 5.0E-2
A-TF-E2	1.1E-1 ± 6.7E-2	< -5.2E-2 ± 5.4E-2	< 3.9E-2 ± 6.0E-2	< 1.1E-4 ± 1.9E-4	3.7E-3 ± 1.1E-3	3.2E-1 ± 9.9E-2
A-TF-E3	< 6.0E-2 ± 7.7E-2	< -2.1E-2 ± 5.4E-2	< 6.8E-2 ± 8.3E-2	2.9E-4 ± 1.6E-4	4.3E-3 ± 7.3E-4	2.9E-1 ± 9.0E-2
A-TF-E4	9.9E-2 ± 8.0E-2	< -8.7E-3 ± 6.0E-2	< 5.8E-4 ± 8.0E-2	3.2E-4 ± 1.7E-4	8.6E-3 ± 1.2E-3	3.0E-1 ± 9.5E-2
A-TF-W1	8.1E-2 ± 7.1E-2	< -3.4E-2 ± 5.4E-2	< 2.0E-2 ± 6.5E-2	1.8E-4 ± 1.4E-4	3.4E-3 ± 6.6E-4	1.9E-1 ± 6.4E-2
A-TF-W2	9.1E-2 ± 7.2E-2	< 3.4E-2 ± 5.5E-2	< 3.4E-2 ± 9.2E-2	2.3E-4 ± 1.5E-4	3.3E-3 ± 6.1E-4	2.4E-1 ± 7.8E-2
AW-TF-E	< -8.2E-3 ± 1.4E-1	< -1.9E-2 ± 8.3E-2	< -1.3E-2 ± 1.0E-1	2.8E-4 ± 1.7E-4	4.2E-3 ± 7.4E-4	3.1E-1 ± 9.8E-2
B-TF-NE	1.2E-1 ± 9.0E-2	< -1.2E-1 ± 7.0E-2	< 2.1E-1 ± 3.0E-1	2.6E-4 ± 1.6E-4	7.4E-3 ± 1.1E-3	3.2E-1 ± 1.0E-1
B-TF-SE	< 3.5E-2 ± 6.8E-2	7.2E-2 ± 4.3E-2	< 4.3E-2 ± 1.1E-1	4.5E-4 ± 3.3E-4	1.3E-2 ± 2.3E-3	6.0E-2 ± 2.8E-2
BX-TF-W	1.3E-1 ± 8.2E-2	< -4.9E-2 ± 6.0E-2	< -5.4E-3 ± 7.1E-2	2.7E-4 ± 1.6E-4	5.9E-3 ± 9.0E-4	4.0E-1 ± 1.2E-1
C-TF-NE	< 2.7E-2 ± 6.6E-2	< -7.9E-3 ± 4.5E-2	< 6.7E-2 ± 6.9E-2	2.4E-4 ± 1.6E-4	1.6E-2 ± 2.0E-3	4.4E-1 ± 1.3E-1
C-TF-SE	9.6E-2 ± 6.1E-2	< 1.8E-2 ± 5.4E-2	6.9E-2 ± 6.3E-2	7.5E-4 ± 2.6E-4	4.6E-3 ± 7.5E-4	2.4E-1 ± 7.8E-2
Maximum	1.3E-1	7.2E-2	2.1E-1	7.5E-4	1.6E-2	4.4E-1
Minimum	-8.2E-3	-1.2E-1	-1.3E-2	-3.2E-5	1.6E-3	6.0E-2
200 West Area						
2WN	< 4.2E-3 ± 7.3E-2	< -2.5E-2 ± 4.7E-2	< 4.4E-2 ± 4.4E-2	< 3.9E-5 ± 1.1E-4	3.6E-3 ± 9.9E-4	3.4E-1 ± 1.1E-1
2WNE	< 6.4E-2 ± 8.0E-2	< -1.6E-2 ± 5.5E-2	5.9E-2 ± 5.8E-2	2.9E-4 ± 2.0E-4	9.9E-3 ± 1.5E-3	2.0E-1 ± 6.8E-2
2WSE	< 4.5E-2 ± 9.1E-2	< 2.1E-2 ± 5.6E-2	< 4.3E-2 ± 6.5E-2	6.3E-4 ± 3.6E-4	1.7E-2 ± 2.6E-3	2.9E-1 ± 9.3E-2
S-TF-NE	< -1.6E-3 ± 9.1E-2	< 1.3E-2 ± 5.6E-2	< 1.8E-2 ± 7.2E-2	1.6E-3 ± 6.5E-4	2.2E-2 ± 3.6E-3	2.5E-1 ± 8.1E-2
S-TF-SE	< -4.4E-3 ± 7.7E-2	< 2.9E-2 ± 4.9E-2	< -9.9E-3 ± 1.2E-1	1.7E-2 ± 2.2E-3	4.9E-2 ± 5.5E-3	2.8E-1 ± 9.0E-2
S-TF-W	< 7.5E-2 ± 7.6E-2	< 2.6E-2 ± 5.1E-2	7.0E-2 ± 6.5E-2	3.6E-4 ± 2.2E-4	9.9E-3 ± 1.5E-3	2.4E-1 ± 7.8E-2
TX-TF-NE	< 2.8E-2 ± 7.5E-2	< 2.3E-2 ± 5.5E-2	< 3.0E-2 ± 7.6E-2	< 1.3E-4 ± 1.6E-4	5.4E-3 ± 9.7E-4	4.2E-1 ± 1.3E-1
TX-TF-W	7.1E-2 ± 6.4E-2	< 2.9E-2 ± 4.8E-2	< -2.7E-4 ± 6.7E-2	9.4E-4 ± 3.5E-4	3.5E-2 ± 4.1E-3	3.9E-1 ± 1.2E-1
U-TF-NE (a)	b	b	b	b	< 1.0E+0	b
U-TF-SE	< 6.0E-2 ± 6.0E-2	6.5E-2 ± 5.2E-2	< -4.6E-2 ± 7.6E-2	2.2E-3 ± 5.5E-4	1.0E-1 ± 1.1E-2	2.8E-1 ± 9.0E-2
U-TF-W	8.8E-2 ± 6.6E-2	< 2.7E-2 ± 4.0E-2	4.8E-2 ± 4.7E-2	9.9E-3 ± 1.5E-3	5.6E-1 ± 5.9E-2	3.7E-1 ± 1.1E-1
Maximum	8.8E-2	6.5E-2	7.0E-2	1.7E-2	1.0E+0	4.2E-1
Minimum	-4.4E-3	-2.5E-2	-4.6E-2	3.9E-5	3.6E-3	2.0E-1
Soil Standards	3,000	3,000	20,000	75	75	

NOTE: Negative values indicate concentrations at or near background levels of radioactivity.
(a) No counting error available, samples sent to 222-S laboratory.
(b) Radionuclide not reported.

9 2 1 2 1 6 2 0 3 7 3

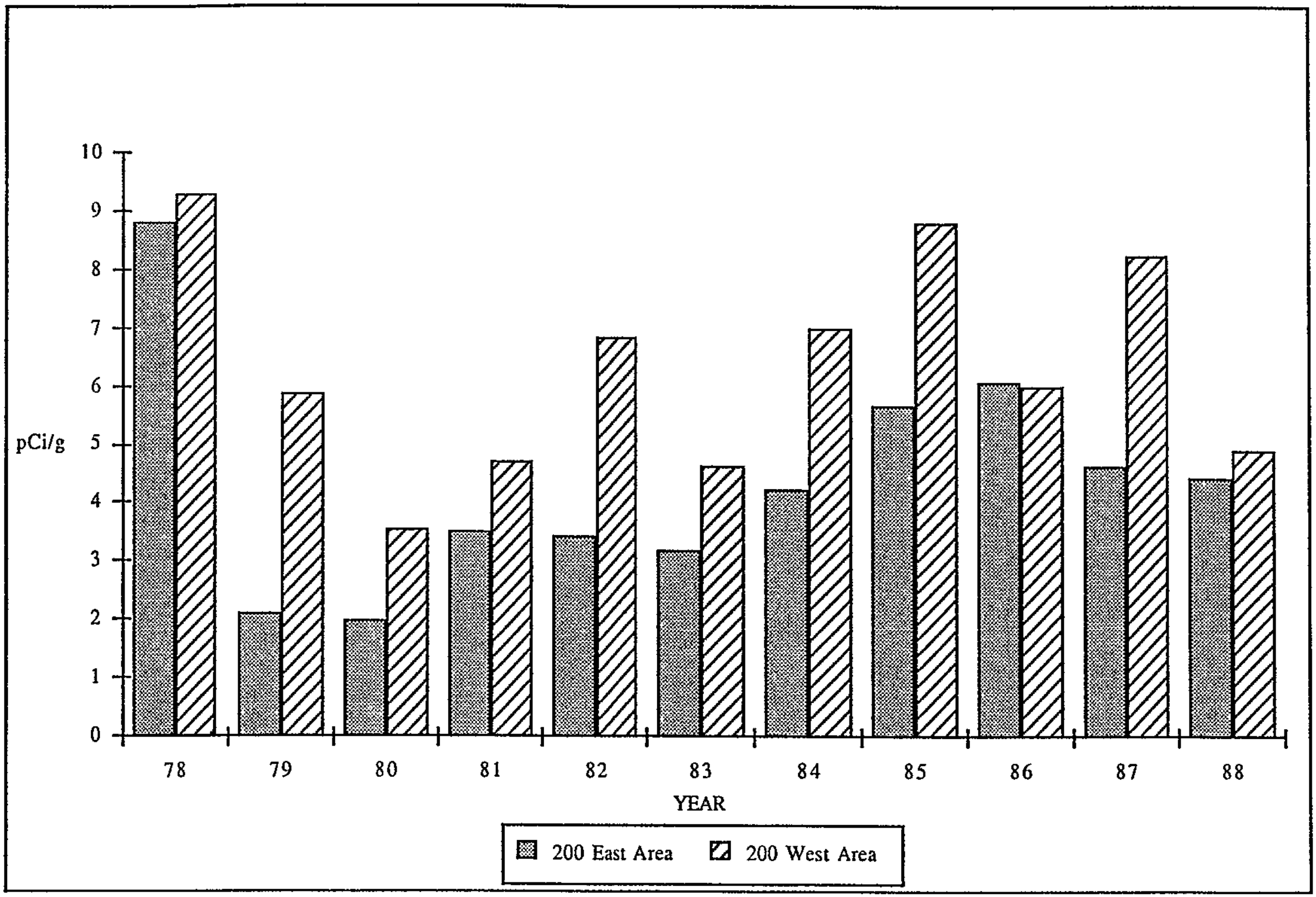

Figure E-7. Yearly Averages for Cesium-137 in Soil.

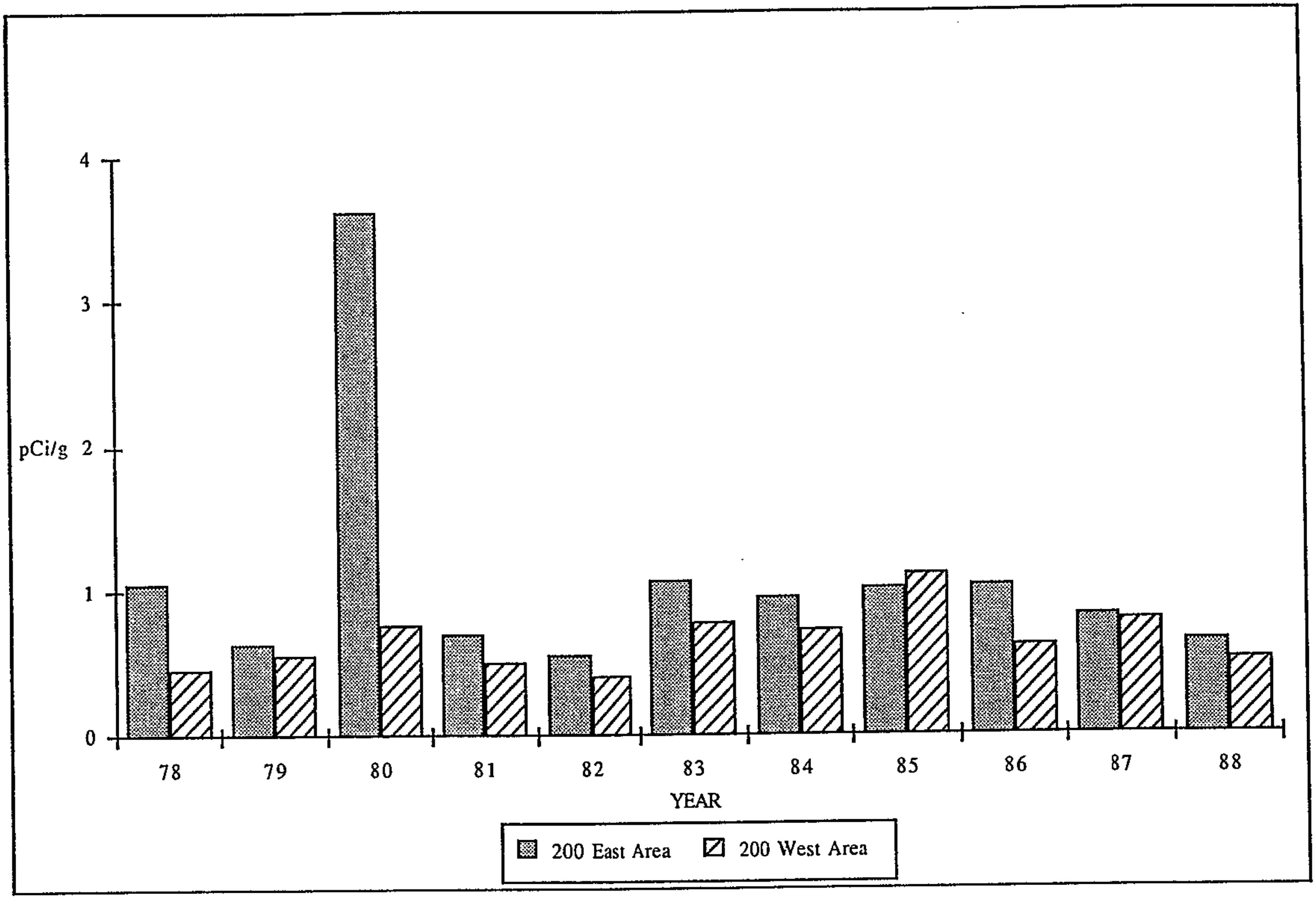

Figure E-8. Yearly Averages for Strontium-90 in Soil.

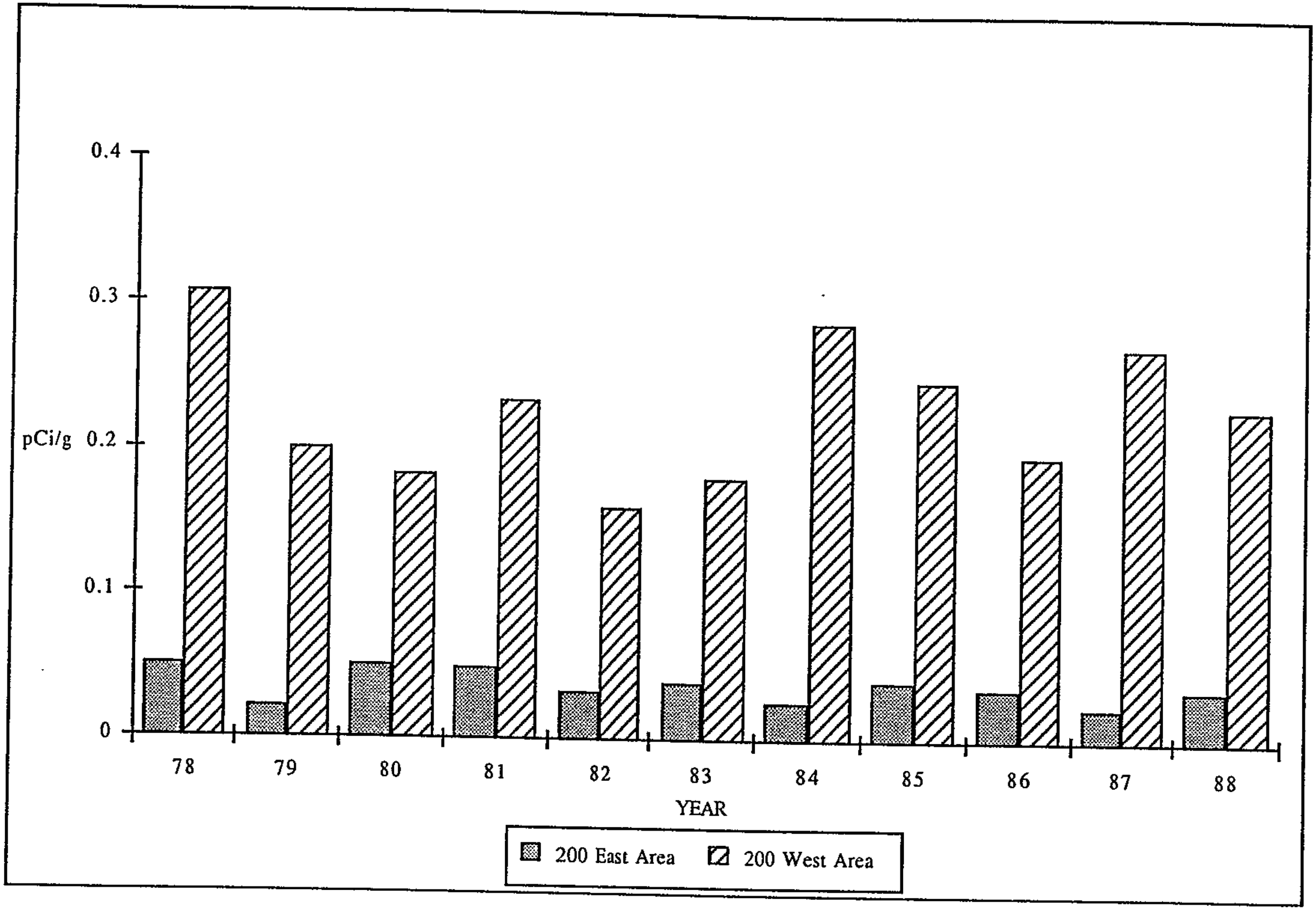

Figure E-9. Yearly Averages for Plutonium-239 in Soil.

Table E-4. Grid Site Vegetation Results for 200 East Area for 1988 (pCi/g dry weight). (Sheet 1 of 3)

Location	Co-60 ± Error	Sr-90 ± Error	Nb-95 ± Error	Zr-95 ± Error	Tc-99 ± Error
2E 1	< 3.5E-3 ± 1.7E-2	a	< -2.5E-2 ± 6.2E-2	< 2.5E-2 ± 5.6E-2	a
2E 2	< 8.7E-3 ± 1.5E-2	a	6.0E-2 ± 5.3E-2	< 3.5E-2 ± 4.7E-2	a
2E 3	< -5.7E-3 ± 1.7E-2	a	< 1.6E-2 ± 5.9E-2	< 3.1E-2 ± 5.5E-2	a
2E 4	< -1.0E-2 ± 2.2E-2	1.4E-1 ± 2.9E-2	< 4.6E-2 ± 5.7E-2	< 2.4E-2 ± 6.2E-2	a
2E 5	< 5.2E-3 ± 1.8E-2	a	5.7E-2 ± 5.5E-2	< 0.0E+0 ± 5.9E-2	a
2E 6	2.4E-2 ± 1.8E-2	2.9E-1 ± 5.6E-2	< 6.2E-3 ± 6.3E-2	< 7.2E-3 ± 5.4E-2	a
2E 7	< -3.1E-3 ± 1.7E-2	a	< 6.2E-4 ± 6.4E-2	< -3.7E-2 ± 6.0E-2	a
2E 8	< 6.7E-3 ± 1.6E-2	5.5E-2 ± 1.3E-2	< 1.3E-2 ± 5.0E-2	< -2.9E-2 ± 5.0E-2	a
2E 9	< -8.8E-3 ± 1.8E-2	8.0E-1 ± 1.5E-1	< -1.5E-2 ± 6.3E-2	< -2.8E-4 ± 5.8E-2	< 6.4E-1 ± 2.9E+0
2E10	< 5.0E-3 ± 1.6E-2	6.6E-1 ± 1.3E-1	< -6.1E-3 ± 5.3E-2	< -9.6E-3 ± 5.0E-2	< 7.1E-1 ± 2.9E+0
2E11	< 1.1E-3 ± 2.1E-2	a	< -3.3E-3 ± 6.9E-2	< -6.7E-3 ± 6.4E-2	a
2E12	< 7.7E-3 ± 1.5E-2	3.4E+0 ± 6.6E-1	< -4.0E-2 ± 5.3E-2	< 3.7E-2 ± 4.6E-2	a
2E13	< 3.9E-3 ± 2.2E-2	a	< 1.8E-2 ± 6.9E-2	< 6.1E-3 ± 6.7E-2	a
2E14	< 8.1E-4 ± 1.7E-2	2.2E-2 ± 8.5E-3	< 1.3E-2 ± 4.7E-2	< 5.2E-3 ± 4.5E-2	a
2E15	< -1.4E-3 ± 1.3E-2	a	< 1.5E-2 ± 4.7E-2	< -7.1E-2 ± 4.1E-2	a
2E16	< -8.6E-3 ± 1.7E-2	a	< -3.8E-2 ± 6.3E-2	< 2.3E-2 ± 5.7E-2	a
2E17	1.8E-2 ± 1.7E-2	7.2E+0 ± 1.5E+0	< -5.6E-2 ± 5.4E-2	< 4.2E-2 ± 4.5E-2	< 2.7E+0 ± 3.0E+0
2E18	< 4.8E-3 ± 1.4E-2	1.1E+0 ± 2.1E-1	< -1.9E-2 ± 4.6E-2	< 3.8E-2 ± 4.3E-2	< 2.4E+0 ± 3.0E+0
2E19	2.0E-2 ± 1.6E-2	1.7E-1 ± 3.5E-2	< 7.2E-3 ± 5.4E-2	< 2.6E-3 ± 5.2E-2	a
2E20	< -1.3E-2 ± 1.7E-2	2.8E-1 ± 5.4E-2	< 4.9E-2 ± 5.6E-2	< 1.1E-2 ± 5.0E-2	a
2E21	< 1.1E-2 ± 1.3E-2	a	< 2.8E-3 ± 4.6E-2	< 1.5E-2 ± 4.6E-2	a
2E22	< -3.1E-3 ± 1.8E-2	a	< -1.8E-2 ± 5.5E-2	< 1.9E-2 ± 5.5E-2	a
2E23	< -5.4E-3 ± 2.2E-2	1.4E-1 ± 2.9E-2	< -4.4E-2 ± 6.5E-2	< -3.6E-2 ± 6.1E-2	< 1.1E+0 ± 2.9E+0
2E24	< 9.7E-3 ± 1.9E-2	8.9E-1 ± 1.7E-1	< -1.4E-2 ± 7.1E-2	< 2.8E-2 ± 6.8E-2	< 2.3E+0 ± 3.0E+0
2E25	< -1.7E-2 ± 1.8E-2	a	< -2.3E-2 ± 6.1E-2	< -1.3E-2 ± 5.8E-2	a
2E26	< -1.8E-3 ± 1.9E-2	4.9E-2 ± 1.2E-2	< 2.9E-2 ± 6.0E-2	< 1.1E-2 ± 5.1E-2	a
2E27	< 1.1E-2 ± 1.9E-2	a	< -1.3E-2 ± 6.6E-2	< 4.9E-2 ± 6.0E-2	a
2E28	< -3.4E-3 ± 1.4E-2	6.6E-2 ± 1.8E-2	< 2.4E-2 ± 3.5E-2	< -9.6E-3 ± 3.9E-2	a
2E29	< 1.2E-2 ± 2.1E-2	1.9E-1 ± 3.8E-2	< -3.0E-2 ± 7.0E-2	< 1.7E-2 ± 6.4E-2	a
2E30	< 1.0E-2 ± 1.5E-2	4.7E-1 ± 9.0E-2	< 1.4E-2 ± 4.9E-2	< 4.3E-2 ± 4.7E-2	a
2E31	< -5.6E-3 ± 1.9E-2	a	< -5.1E-2 ± 6.0E-2	< 2.5E-2 ± 5.1E-2	a
2E32	< -8.4E-3 ± 2.0E-2	a	< -2.2E-2 ± 6.3E-2	< -2.7E-3 ± 5.6E-2	a
2E33	< 4.6E-3 ± 2.2E-2	1.8E-1 ± 3.4E-2	< -2.6E-2 ± 9.0E-2	< -2.9E-2 ± 8.4E-2	a
2E34	< 5.1E-3 ± 2.0E-2	a	< -3.5E-2 ± 7.5E-2	< -1.4E-2 ± 6.1E-2	a
2E35	< 4.4E-3 ± 2.0E-2	1.9E-1 ± 3.9E-2	< 1.8E-2 ± 6.0E-2	< 4.8E-2 ± 5.3E-2	a
2E36	2.4E-2 ± 1.8E-2	a	< 4.2E-2 ± 5.8E-2	< 5.5E-3 ± 4.7E-2	a
2EA	< -1.1E-2 ± 1.6E-2	8.1E-1 ± 1.5E-1	< -3.7E-2 ± 5.3E-2	< 2.5E-2 ± 4.9E-2	a
2EB	< 1.6E-2 ± 2.0E-2	a	< -7.8E-2 ± 7.3E-2	< 4.7E-2 ± 6.1E-2	a
2EC	< -8.1E-3 ± 2.9E-2	a	< -1.2E-1 ± 1.3E-1	< 1.4E-2 ± 1.1E-1	a
2ED	< -1.4E-3 ± 2.0E-2	3.0E-1 ± 5.7E-2	< 2.1E-2 ± 7.0E-2	6.9E-2 ± 6.6E-2	< 1.4E+0 ± 3.0E+0
GRT1	< -1.6E-3 ± 1.4E-2	2.7E-1 ± 5.1E-2	< 7.6E-3 ± 1.2E-2	< 3.5E-3 ± 2.1E-2	< 2.4E+0 ± 3.1E+0
GRT2	< -1.6E-2 ± 1.9E-2	1.1E-1 ± 2.4E-2	< -1.2E-2 ± 1.7E-2	< 1.0E-2 ± 2.8E-2	< 2.5E+0 ± 3.1E+0
GRT4	< 5.3E-3 ± 1.8E-2	1.9E-1 ± 3.7E-2	< 4.4E-3 ± 1.8E-2	< -5.6E-3 ± 3.2E-2	< 2.1E+0 ± 3.0E+0
GRT5	< -2.7E-3 ± 1.5E-2	2.2E-1 ± 4.2E-2	< -5.5E-3 ± 1.4E-2	< 5.6E-3 ± 2.4E-2	< 2.0E+0 ± 3.0E+0
GRT6	< 2.4E-3 ± 1.7E-2	2.7E-1 ± 5.0E-2	< -1.4E-2 ± 1.5E-2	< -4.8E-3 ± 2.5E-2	< 1.4E+0 ± 3.0E+0
Maximum	2.4E-2	7.2E+0	6.0E-2	6.9E-2	2.7E+0
Minimum	-1.7E-2	2.2E-2	-1.2E-1	-7.1E-2	6.4E-1
Mean	2.0E-3	7.1E-1	-6.3E-3	1.0E-2	1.8E+0
Background (c)		4.3E-2			

Table E-4. Grid Site Vegetation Results for 200 East Area for 1988 (pCi/g dry weight). (Sheet 2 of 3)

Location	Ru-106 ± Error	I-129 ± Error	Cs-134 ± Error	Cs-137 ± Error	Ce-141 ± Error
2E 1	b	a	b	9.3E-2 ± 2.4E-2	< -7.7E-3 ± 6.5E-2
2E 2	b	a	6.1E-2 ± 1.6E-2	5.7E-1 ± 6.5E-2	< 6.0E-2 ± 6.6E-2
2E 3	b	a	b	4.6E-1 ± 5.4E-2	< -2.3E-2 ± 6.4E-2
2E 4	b	a	b	5.5E-1 ± 7.4E-2	< -4.9E-4 ± 6.8E-2
2E 5	b	a	b	1.8E-1 ± 3.2E-2	< 2.9E-2 ± 7.0E-2
2E 6	b	a	b	1.7E-1 ± 2.9E-2	< 1.7E-2 ± 6.9E-2
2E 7	b	a	b	8.6E-2 ± 2.5E-2	< -5.2E-2 ± 6.8E-2
2E 8	b	a	b	7.0E-2 ± 2.0E-2	< -2.0E-2 ± 7.6E-2
2E 9	b	< 2.6E-1 ± 4.1E-1	b	4.0E-1 ± 5.2E-2	< 2.3E-2 ± 7.1E-2
2E10	b	< 9.2E-3 ± 2.6E-1	b	6.8E-1 ± 7.9E-2	< 2.5E-2 ± 6.9E-2
2E11	b	a	b	1.4E-1 ± 3.1E-2	< -1.8E-2 ± 8.3E-2
2E12	b	a	b	3.6E-1 ± 4.4E-2	< 1.4E-4 ± 5.9E-2
2E13	b	a	b	3.6E-2 ± 2.5E-2	< 2.1E-3 ± 9.7E-2
2E14	b	< 3.3E-2 ± 3.6E-1	b	8.7E-2 ± 1.9E-2	< -1.6E-2 ± 5.8E-2
2E15	b	a	b	2.2E-1 ± 3.1E-2	< 3.5E-2 ± 6.2E-2
2E16	b	a	2.3E-2 ± 1.6E-2	2.8E-1 ± 3.9E-2	< -2.8E-2 ± 8.3E-2
2E17	b	< 9.2E-3 ± 2.9E-1	b	3.5E-1 ± 4.5E-2	< -2.2E-2 ± 6.2E-2
2E18	b	3.5E-1 ± 2.5E-1	b	7.0E-1 ± 7.9E-2	< -3.3E-2 ± 6.2E-2
2E19	b	a	b	2.7E-2 ± 1.4E-2	< -5.1E-2 ± 5.4E-2
2E20	b	a	b	1.7E-1 ± 2.8E-2	< -1.4E-2 ± 6.1E-2
2E21	b	a	b	1.7E-1 ± 2.5E-2	< 2.6E-2 ± 5.5E-2
2E22	b	a	b	1.5E-1 ± 2.8E-2	< -4.2E-2 ± 7.6E-2
2E23	3.4E-1 ± 2.0E-1	< -3.8E-1 ± 4.1E-1	b	1.4E-1 ± 2.9E-2	< 2.1E-2 ± 7.7E-2
2E24	b	< 1.5E-1 ± 2.6E-1	b	1.3E+0 ± 1.4E-1	< 2.3E-2 ± 8.8E-2
2E25	b	a	b	2.2E-1 ± 3.5E-2	< -3.2E-3 ± 7.8E-2
2E26	b	a	b	9.6E-2 ± 2.2E-2	< 3.0E-2 ± 7.7E-2
2E27	b	a	b	8.0E-2 ± 2.4E-2	< -8.4E-2 ± 7.6E-2
2E28	b	a	b	1.6E-1 ± 2.4E-2	< 1.4E-2 ± 4.3E-2
2E29	b	a	b	7.6E-2 ± 3.1E-2	< -5.2E-2 ± 7.4E-2
2E30	2.8E+0 ± 3.6E-1	a	b	3.9E-1 ± 4.8E-2	< 2.1E-2 ± 7.2E-2
2E31	b	a	b	2.9E-2 ± 1.6E-2	< 3.5E-2 ± 7.0E-2
2E32	b	a	b	1.3E-1 ± 2.8E-2	< -8.6E-3 ± 7.4E-2
2E33	b	a	b	1.3E-1 ± 4.1E-2	< -5.2E-2 ± 9.6E-2
2E34	b	a	b	7.5E-2 ± 2.2E-2	< 2.7E-2 ± 7.8E-2
2E35	b	a	b	2.4E-1 ± 3.6E-2	< 8.7E-3 ± 7.8E-2
2E36	4.8E-1 ± 1.8E-1	a	5.9E-2 ± 2.0E-2	5.0E-1 ± 6.2E-2	< -1.6E-2 ± 7.7E-2
2EA	3.1E-1 ± 1.6E-1	a	b	1.4E-1 ± 2.4E-2	< -8.4E-2 ± 6.5E-2
2EB	5.3E-1 ± 2.1E-1	a	b	1.4E-1 ± 2.9E-2	< 1.8E-2 ± 8.5E-2
2EC	1.5E+0 ± 3.8E-1	a	b	5.8E-1 ± 7.5E-2	< -5.5E-2 ± 1.4E-1
2ED	1.1E+0 ± 2.7E-1	< 3.4E-1 ± 8.4E-1	3.8E-2 ± 2.0E-2	6.4E-1 ± 7.5E-2	< -9.5E-2 ± 9.6E-2
GRT1	1.5E+0 ± 2.3E-1	3.3E-1 ± 2.1E-1	b	3.4E-1 ± 4.3E-2	< -7.5E-3 ± 1.4E-2
GRT2	2.2E-1 ± 1.7E-1	< 1.3E-1 ± 2.2E-1	b	1.7E-1 ± 3.7E-2	< -1.5E-3 ± 1.9E-2
GRT4	2.5E+0 ± 3.9E-1	< 3.3E-1 ± 3.4E-1	b	1.8E-1 ± 3.4E-2	2.3E-2 ± 2.1E-2
GRT5	4.6E-1 ± 1.8E-1	< -9.2E-3 ± 2.6E-1	b	2.3E-1 ± 3.3E-2	< 8.3E-3 ± 1.6E-2
GRT6	5.1E-1 ± 1.7E-1	< 9.2E-3 ± 2.6E-1	3.1E-2 ± 1.4E-2	4.0E-1 ± 5.1E-2	< -5.1E-3 ± 1.9E-2
Maximum	2.8E+0	3.5E-1	6.1E-2	1.3E+0	6.0E-2
Minimum	2.2E-1	-3.8E-1	2.3E-2	2.7E-2	-9.5E-2
Mean	1.0E+0	1.2E-1	4.2E-2	2.7E-1	-7.7E-3
Background (c)				1.6E-2	

Table E-4. Grid Site Vegetation Results for 200 East Area for 1988 (pCi/g dry weight). (Sheet 3 of 3)

Location	Eu-152 ± Error	Eu-154 ± Error	Eu-155 ± Error	Pu-238 ± Error	Pu-239 ± Error
2E 1	< 6.6E-2 ± 7.4E-2	5.4E-2 ± 5.3E-2	< 2.8E-2 ± 4.2E-2	a	a
2E 2	< 6.2E-2 ± 6.4E-2	< 4.1E-2 ± 4.6E-2	< 6.2E-3 ± 3.6E-2	a	a
2E 3	< -3.3E-2 ± 7.4E-2	< 3.1E-2 ± 5.5E-2	< 3.2E-4 ± 3.8E-2	a	a
2E 4	< 5.8E-2 ± 9.5E-2	< -5.2E-2 ± 7.6E-2	< 2.4E-2 ± 5.6E-2	a	a
2E 5	< 6.5E-2 ± 6.7E-2	< -4.5E-2 ± 6.6E-2	< 1.6E-2 ± 4.9E-2	a	a
2E 6	< 2.5E-2 ± 8.4E-2	< 3.2E-2 ± 5.6E-2	< -1.8E-2 ± 3.5E-2	3.0E-4 ± 2.6E-4	1.3E-3 ± 5.7E-4
2E 7	< -2.3E-2 ± 8.5E-2	< -7.1E-2 ± 5.8E-2	< -2.2E-3 ± 4.3E-2	a	a
2E 8	< 2.1E-2 ± 6.5E-2	< -3.3E-2 ± 5.8E-2	< 1.6E-2 ± 3.9E-2	a	a
2E 9	< 1.2E-2 ± 7.1E-2	< 3.1E-2 ± 5.3E-2	< 3.9E-2 ± 4.2E-2	< -1.5E-5 ± 3.9E-5	1.7E-3 ± 6.0E-4
2E10	< -8.0E-3 ± 6.7E-2	< -1.3E-2 ± 5.5E-2	< -2.3E-3 ± 4.2E-2	< 9.2E-5 ± 1.6E-4	2.7E-3 ± 8.4E-4
2E11	< 4.7E-2 ± 9.7E-2	< -4.1E-2 ± 7.1E-2	< -1.8E-4 ± 5.8E-2	a	a
2E12	< -6.4E-2 ± 6.8E-2	< 1.2E-2 ± 5.0E-2	< -6.8E-4 ± 3.7E-2	a	a
2E13	< 4.2E-2 ± 8.9E-2	< -2.8E-2 ± 7.5E-2	< -7.9E-3 ± 6.3E-2	a	a
2E14	< 4.3E-2 ± 6.2E-2	< 1.7E-2 ± 4.9E-2	< 1.3E-2 ± 4.0E-2	a	a
2E15	< 5.7E-2 ± 6.0E-2	< -8.9E-3 ± 3.8E-2	< 9.8E-3 ± 3.9E-2	a	a
2E16	< 8.0E-3 ± 7.4E-2	< -2.7E-3 ± 5.1E-2	< -1.8E-2 ± 4.5E-2	a	a
2E17	< -2.8E-2 ± 6.9E-2	< 2.2E-2 ± 5.2E-2	< 1.8E-2 ± 4.1E-2	4.1E-4 ± 2.5E-4	1.1E-2 ± 1.7E-3
2E18	< 0.0E+0 ± 6.4E-2	< -1.2E-2 ± 4.7E-2	< 3.2E-2 ± 3.7E-2	2.5E-4 ± 2.0E-4	2.0E-3 ± 6.2E-4
2E19	< 2.6E-2 ± 7.2E-2	< 3.8E-2 ± 5.3E-2	< -1.0E-2 ± 3.4E-2	a	a
2E20	< 9.9E-3 ± 7.3E-2	< 7.9E-3 ± 4.9E-2	< 1.4E-2 ± 3.7E-2	a	a
2E21	< 3.4E-2 ± 5.9E-2	< -1.6E-2 ± 4.4E-2	< -6.5E-3 ± 3.2E-2	a	a
2E22	< 0.0E+0 ± 7.2E-2	< 3.2E-2 ± 5.9E-2	< 8.9E-3 ± 4.4E-2	a	a
2E23	< 2.5E-2 ± 8.1E-2	< -1.7E-2 ± 7.2E-2	< -2.5E-2 ± 5.3E-2	< 9.6E-5 ± 1.3E-4	2.2E-3 ± 6.1E-4
2E24	< 2.7E-2 ± 8.5E-2	< 5.5E-2 ± 6.2E-2	< 2.6E-2 ± 5.0E-2	< 1.9E-4 ± 2.5E-4	1.2E-2 ± 2.1E-3
2E25	< 3.4E-2 ± 8.0E-2	< 2.4E-2 ± 5.7E-2	< -8.5E-4 ± 5.3E-2	a	a
2E26	6.3E-2 ± 6.2E-2	< 1.3E-2 ± 5.4E-2	< 3.7E-2 ± 4.5E-2	a	a
2E27	< 3.1E-2 ± 7.0E-2	< -6.3E-3 ± 5.3E-2	< 2.6E-2 ± 4.6E-2	a	a
2E28	< 1.2E-2 ± 5.9E-2	< 2.7E-2 ± 4.3E-2	< 2.3E-2 ± 3.3E-2	a	a
2E29	< -3.1E-2 ± 8.7E-2	< 4.4E-2 ± 6.2E-2	< -2.5E-2 ± 4.6E-2	a	a
2E30	< 1.8E-2 ± 6.3E-2	< -2.3E-2 ± 4.8E-2	< -2.5E-3 ± 4.0E-2	a	a
2E31	< 2.8E-2 ± 6.9E-2	< 4.9E-2 ± 5.9E-2	< 3.3E-3 ± 4.9E-2	a	a
2E32	< -6.5E-2 ± 9.2E-2	< 6.7E-3 ± 6.5E-2	< 1.8E-2 ± 4.7E-2	a	a
2E33	< 3.3E-2 ± 1.1E-1	< -1.8E-2 ± 7.9E-2	< 5.2E-2 ± 6.6E-2	a	a
2E34	< 7.5E-2 ± 8.3E-2	< 4.8E-3 ± 6.3E-2	< 2.8E-2 ± 4.4E-2	a	a
2E35	< 4.5E-2 ± 8.9E-2	< -4.3E-2 ± 6.6E-2	< 4.4E-3 ± 5.2E-2	< -3.5E-5 ± 5.7E-5	2.7E-3 ± 8.0E-4
2E36	< -4.3E-2 ± 7.5E-2	< 4.0E-2 ± 5.4E-2	< 2.5E-2 ± 4.9E-2	a	a
2EA	< 1.9E-2 ± 6.5E-2	< 1.8E-2 ± 5.3E-2	3.9E-2 ± 3.9E-2	< 1.5E-4 ± 2.7E-4	2.3E-3 ± 6.3E-4
2EB	< 6.4E-3 ± 8.7E-2	< -1.6E-2 ± 5.3E-2	< 1.4E-2 ± 4.4E-2	a	a
2EC	2.2E-1 ± 1.3E-1	< -4.0E-4 ± 9.0E-2	< 8.6E-3 ± 7.0E-2	a	a
2ED	< 3.0E-2 ± 8.6E-2	< -1.1E-1 ± 6.7E-2	< 3.4E-2 ± 5.1E-2	1.5E-4 ± 1.5E-4	1.5E-2 ± 2.1E-3
GRT1	< 3.8E-3 ± 4.7E-2	< 7.6E-3 ± 4.1E-2	< 7.2E-3 ± 3.4E-2	< 9.6E-5 ± 1.9E-4	6.3E-3 ± 1.3E-3
GRT2	< 1.2E-2 ± 8.1E-2	6.4E-2 ± 5.5E-2	< 1.3E-3 ± 4.3E-2	< 7.9E-5 ± 1.5E-4	1.6E-3 ± 7.9E-4
GRT4	< -2.3E-2 ± 7.9E-2	< -1.2E-2 ± 6.1E-2	< -1.9E-2 ± 5.4E-2	< -4.9E-5 ± 1.1E-4	2.6E-3 ± 8.0E-4
GRT5	< -2.1E-2 ± 5.8E-2	< -1.5E-2 ± 4.8E-2	< 2.0E-2 ± 4.2E-2	< 1.9E-4 ± 2.6E-4	2.3E-3 ± 7.3E-4
GRT6	< -2.2E-2 ± 7.0E-2	< 1.4E-2 ± 4.9E-2	< 2.9E-2 ± 4.6E-2	< -3.9E-5 ± 1.9E-4	6.7E-3 ± 1.3E-3
Maximum	2.2E-1	6.4E-2	5.2E-2	4.1E-4	1.5E-2
Minimum	-6.5E-2	-1.1E-1	-2.5E-2	-4.9E-5	1.3E-3
Mean	2.0E-2	2.4E-3	1.1E-2	1.2E-4	4.7E-3
Background (c)					3.5E-4

NOTE: Negative values indicate concentrations at or near background levels of radioactivity.

(a) Not analyzed for this radionuclide.

(b) Not routinely reported.

(c) Derived from PNL 1988 data (PNL 1989). Background numbers represent mean + 2 SE.

Table E-5. Grid Site Vegetation Results for 200 West Area for 1988 (pCi/g dry weight). (Sheet 1 of 3)

Location	Co-60 ± Error	Sr-90 ± Error	Nb-95 ± Error	Tc-99 ± Error	I-129 ± Error
2W 2	< -5.2E-3 ± 2.0E-2	a	< -5.4E-2 ± 5.8E-2	a	a
2W 3	< 5.3E-3 ± 1.3E-2	a	< -3.6E-2 ± 3.7E-2	a	a
2W 4	2.1E-2 ± 2.1E-2	8.3E-2 ± 1.8E-2	< -3.1E-2 ± 4.7E-2	a	a
2W 5	< -4.2E-3 ± 1.9E-2	a	< -2.5E-2 ± 5.6E-2	a	a
2W 6	< 9.8E-3 ± 1.9E-2	a	< 1.2E-2 ± 6.2E-2	a	a
2W 7	< -1.2E-2 ± 1.9E-2	a	< -2.3E-2 ± 5.7E-2	a	a
2W 8	< 7.1E-3 ± 1.3E-2	8.9E-2 ± 1.9E-2	< 9.5E-3 ± 1.4E-2	< 1.2E+0 ± 1.7E+0	3.5E-1 ± 3.4E-1
2W 9	< 6.6E-3 ± 2.1E-2	3.0E+0 ± 5.7E-1	< 2.5E-3 ± 7.6E-2	< 8.0E-1 ± 1.7E+0	< -3.0E-1 ± 3.4E-1
2W10	< -1.2E-2 ± 2.0E-2	a	< -5.0E-2 ± 6.7E-2	a	a
2W12	< -7.9E-3 ± 1.6E-2	7.2E-2 ± 1.6E-2	< 3.9E-2 ± 6.1E-2	1.8E+0 ± 1.8E+0	< -1.7E-1 ± 3.4E-1
2W13	< -2.5E-3 ± 1.9E-2	2.3E-1 ± 4.7E-2	< 3.5E-2 ± 6.7E-2	a	a
2W14	< -4.1E-3 ± 1.7E-2	a	< -7.8E-3 ± 2.2E-2	a	a
2W15	< -1.5E-3 ± 2.0E-2	a	< -1.6E-2 ± 7.2E-2	a	a
2W16	< 8.3E-3 ± 1.3E-2	7.0E-2 ± 1.6E-2	< 1.7E-2 ± 4.5E-2	a	< 1.8E-2 ± 2.4E-1
2W17	< 2.0E-4 ± 1.4E-2	4.5E-2 ± 1.1E-2	< -3.9E-2 ± 5.4E-2	< 1.3E+0 ± 1.8E+0	< 1.6E-1 ± 3.5E-1
2W18	< 2.7E-3 ± 1.6E-2	4.8E-2 ± 1.1E-2	< -8.0E-3 ± 2.8E-2	a	a
2W19	< 1.1E-3 ± 1.6E-2	a	< -3.0E-2 ± 2.9E-2	a	a
2W20	< 3.9E-3 ± 1.9E-2	9.2E-2 ± 2.1E-2	< 3.3E-2 ± 7.0E-2	a	a
2W21	< -2.0E-2 ± 1.7E-2	a	< -3.1E-2 ± 5.6E-2	a	a
2W22	< 6.4E-3 ± 1.8E-2	1.9E-1 ± 3.7E-2	< 5.5E-2 ± 7.3E-2	a	a
2W23	1.7E-2 ± 1.5E-2	a	< 1.5E-2 ± 2.6E-2	a	a
2W24	< 7.2E-3 ± 1.7E-2	1.1E-1 ± 2.3E-2	< 4.2E-2 ± 6.3E-2	1.3E+1 ± 2.9E+0	< -3.3E-1 ± 3.2E-1
2W25	< -6.4E-3 ± 1.3E-2	a	< -2.7E-4 ± 1.8E-2	a	a
2W26	1.4E-2 ± 1.3E-2	a	< -3.8E-3 ± 1.5E-2	a	a
2W27	< -4.5E-3 ± 1.5E-2	1.3E-1 ± 2.7E-2	< 3.1E-2 ± 3.2E-2	a	a
2W28	1.4E-2 ± 1.4E-2	5.8E-1 ± 1.1E-1	< 5.8E-3 ± 1.5E-2	< 1.0E+0 ± 1.8E+0	< 5.5E-2 ± 2.5E-1
2W29	1.9E-2 ± 1.5E-2	4.2E-1 ± 8.0E-2	< -1.3E-2 ± 4.0E-2	a	a
2W30	< 6.1E-3 ± 1.6E-2	1.5E-1 ± 3.0E-2	< -2.2E-2 ± 6.0E-2	a	a
2W31	< 1.1E-2 ± 1.8E-2	a	< -5.3E-2 ± 7.0E-2	a	a
2W32	< -3.8E-4 ± 3.5E-2	3.8E-1 ± 7.3E-2	1.6E-1 ± 1.3E-1	a	a
2W33	< 1.1E-2 ± 1.6E-2	3.5E-1 ± 6.7E-2	< -2.4E-2 ± 6.1E-2	a	a
2W34	< 8.7E-3 ± 1.9E-2	2.9E-1 ± 5.6E-2	< -4.9E-2 ± 3.8E-2	a	a
2W35	< 1.2E-2 ± 1.6E-2	a	< 9.1E-3 ± 1.6E-2	a	a
2WA	< 5.1E-3 ± 1.8E-2	2.2E+0 ± 4.1E-1	< 6.7E-4 ± 3.7E-2	a	a
2WB	< 7.3E-3 ± 2.4E-2	2.0E-1 ± 4.0E-2	< -4.6E-2 ± 9.4E-2	a	a
2WC	< 9.9E-3 ± 1.3E-2	a	< -4.5E-2 ± 5.6E-2	a	a
2WD	< -3.2E-3 ± 1.7E-2	8.6E-2 ± 1.8E-2	< 3.1E-2 ± 6.6E-2	< 1.0E+0 ± 2.9E+0	< -9.2E-3 ± 2.6E-1
2WE	2.2E-2 ± 2.0E-2	a	< 1.1E-2 ± 7.3E-2	a	a
2WF	< -8.7E-4 ± 2.0E-2	a	< -8.0E-3 ± 3.3E-2	a	a
Maximum	2.2E-2	3.0E+0	1.6E-1	1.3E+1	3.5E-1
Minimum	-2.0E-2	4.5E-2	-5.4E-2	8.0E-1	-3.3E-1
Mean	3.9E-3	4.2E-1	-2.7E-3	2.9E+0	-2.9E-2
Background (b)		4.3E-2			

Table E-5. Grid Site Vegetation Results for 200 West Area for 1988 (pCi/g dry weight). (Sheet 2 of 3)

Location	Cs-137 ± Error	Eu-152 ± Error	Eu-154 ± Error	Eu-155 ± Error	Pu-238 ± Error
2W 2	1.4E-1 ± 3.0E-2	< 1.6E-2 ± 8.4E-2	< 3.5E-2 ± 6.4E-2	< 1.9E-2 ± 4.9E-2	a
2W 3	1.9E-1 ± 2.8E-2	< 2.3E-2 ± 5.8E-2	< 1.2E-2 ± 4.2E-2	< 4.7E-4 ± 2.7E-2	a
2W 4	1.5E-1 ± 3.0E-2	< 7.9E-3 ± 9.0E-2	< -2.7E-3 ± 6.7E-2	< 8.7E-3 ± 4.9E-2	a
2W 5	6.5E-2 ± 2.1E-2	< -7.6E-2 ± 8.1E-2	< -7.5E-3 ± 5.7E-2	< 6.8E-3 ± 4.2E-2	a
2W 6	7.2E-2 ± 2.2E-2	< 6.5E-2 ± 8.9E-2	< 4.9E-2 ± 5.8E-2	< -7.4E-3 ± 5.5E-2	a
2W 7	1.2E-1 ± 2.7E-2	< -1.2E-2 ± 7.7E-2	< -4.9E-2 ± 6.0E-2	< 3.2E-3 ± 4.5E-2	a
2W 8	7.3E-1 ± 8.3E-2	< -2.5E-2 ± 6.0E-2	< -2.2E-2 ± 4.3E-2	< 1.6E-2 ± 3.9E-2	2.2E-4 ± 1.7E-4
2W 9	2.1E-1 ± 3.9E-2	< -3.1E-2 ± 1.0E-1	< 6.4E-2 ± 6.6E-2	< 5.6E-2 ± 6.7E-2	a
2W10	1.3E-1 ± 2.8E-2	< -1.0E-2 ± 8.3E-2	7.9E-2 ± 5.7E-2	< 2.1E-4 ± 4.2E-2	a
2W12	4.5E-2 ± 2.0E-2	< -7.1E-2 ± 7.6E-2	< -4.1E-3 ± 5.2E-2	< 2.9E-2 ± 3.7E-2	a
2W13	1.8E+0 ± 1.9E-1	< 5.0E-3 ± 7.5E-2	< -4.4E-2 ± 6.9E-2	5.6E-2 ± 5.1E-2	< 2.8E-4 ± 3.0E-4
2W14	2.2E-1 ± 3.4E-2	< 2.4E-2 ± 7.7E-2	< -2.2E-2 ± 5.5E-2	< 1.8E-2 ± 4.3E-2	a
2W15	1.2E-1 ± 2.8E-2	< 3.6E-2 ± 7.1E-2	< 9.0E-3 ± 6.9E-2	< 1.9E-2 ± 5.4E-2	a
2W16	4.7E-2 ± 1.4E-2	< 2.9E-2 ± 5.1E-2	< 4.5E-4 ± 3.8E-2	< -2.4E-4 ± 2.6E-2	a
2W17	3.2E-2 ± 1.5E-2	< -6.8E-3 ± 5.9E-2	< 1.8E-2 ± 4.1E-2	< 9.7E-4 ± 3.2E-2	a
2W18	1.6E-1 ± 2.8E-2	< 1.7E-2 ± 6.5E-2	< 1.9E-2 ± 4.8E-2	< 1.2E-2 ± 3.6E-2	a
2W19	2.6E-1 ± 3.9E-2	8.7E-2 ± 8.3E-2	< -1.1E-2 ± 5.2E-2	< -4.2E-3 ± 4.1E-2	a
2W20	1.2E-1 ± 2.7E-2	8.7E-2 ± 8.6E-2	< 6.0E-3 ± 6.3E-2	< 0.0E+0 ± 5.5E-2	a
2W21	1.5E-1 ± 2.6E-2	< 4.4E-2 ± 6.5E-2	< 2.9E-2 ± 4.7E-2	< 5.8E-3 ± 4.2E-2	a
2W22	1.1E-1 ± 2.6E-2	< -2.7E-2 ± 8.7E-2	< 7.1E-3 ± 5.3E-2	< 3.7E-2 ± 4.7E-2	a
2W23	1.9E+0 ± 2.0E-1	< 4.1E-2 ± 6.8E-2	< 9.8E-3 ± 4.6E-2	< -1.0E-2 ± 4.0E-2	a
2W24	2.8E-1 ± 3.9E-2	< 3.8E-2 ± 8.1E-2	< -2.1E-3 ± 5.7E-2	< 2.8E-2 ± 5.6E-2	4.6E-4 ± 3.1E-4
2W25	5.0E-1 ± 6.1E-2	< 3.7E-2 ± 6.6E-2	< 7.3E-3 ± 4.3E-2	< 1.9E-2 ± 3.9E-2	a
2W26	1.5E-1 ± 2.5E-2	< 4.9E-2 ± 5.4E-2	< -3.8E-2 ± 4.8E-2	< -2.5E-2 ± 3.2E-2	a
2W27	2.0E-1 ± 3.1E-2	< -1.0E-2 ± 7.5E-2	< -1.5E-2 ± 4.4E-2	< 9.6E-3 ± 3.9E-2	a
2W28	1.4E+0 ± 1.4E-1	< 2.2E-2 ± 6.1E-2	< -3.9E-2 ± 5.0E-2	< 1.0E-2 ± 3.9E-2	a
2W29	1.1E+0 ± 1.2E-1	1.1E-1 ± 6.9E-2	6.6E-2 ± 4.7E-2	< 3.7E-3 ± 4.7E-2	a
2W30	2.2E-1 ± 3.1E-2	< -9.3E-2 ± 7.8E-2	< -4.1E-3 ± 5.2E-2	< -1.8E-2 ± 3.8E-2	a
2W31	1.7E-1 ± 2.9E-2	< -1.3E-2 ± 7.5E-2	< 4.2E-2 ± 5.3E-2	< 2.5E-2 ± 4.3E-2	a
2W32	5.1E-1 ± 6.9E-2	< -4.7E-3 ± 1.5E-1	< -4.8E-2 ± 1.1E-1	< 6.0E-2 ± 9.1E-2	a
2W33	6.4E-1 ± 7.6E-2	1.0E-1 ± 6.6E-2	< 3.0E-2 ± 5.0E-2	< 9.2E-3 ± 3.7E-2	1.6E-3 ± 6.0E-4
2W34	7.2E-1 ± 9.0E-2	< 6.0E-2 ± 8.3E-2	< 3.0E-2 ± 6.4E-2	< -1.2E-2 ± 5.6E-2	a
2W35	2.1E-1 ± 3.5E-2	< 3.0E-2 ± 7.0E-2	< -3.9E-2 ± 5.3E-2	< -2.6E-3 ± 4.4E-2	a
2WA	2.2E-1 ± 3.4E-2	< 2.0E-2 ± 7.8E-2	< 3.8E-3 ± 6.0E-2	< 2.4E-2 ± 5.1E-2	a
2WB	2.7E-1 ± 4.5E-2	< 7.1E-2 ± 1.0E-1	7.6E-2 ± 7.4E-2	< 1.1E-2 ± 5.6E-2	1.5E-3 ± 5.0E-4
2WC	1.5E-1 ± 2.5E-2	< 2.4E-2 ± 6.4E-2	< 2.7E-3 ± 4.5E-2	< 1.9E-2 ± 3.5E-2	a
2WD	4.2E-2 ± 2.0E-2	< 6.3E-2 ± 7.9E-2	< -1.8E-2 ± 5.5E-2	< -8.9E-3 ± 4.1E-2	a
2WE	1.4E-1 ± 2.9E-2	< -9.4E-2 ± 9.8E-2	< 4.5E-2 ± 6.1E-2	< 2.5E-2 ± 5.4E-2	a
2WF	7.4E-2 ± 2.4E-2	< -2.8E-2 ± 8.4E-2	5.7E-2 ± 5.6E-2	< -1.2E-2 ± 4.4E-2	a
Maximum	1.9E+0	1.1E-1	7.9E-2	6.0E-2	1.6E-3
Minimum	3.2E-2	-9.4E-2	-4.9E-2	-2.5E-2	2.2E-4
Mean	3.5E-1	1.6E-2	8.5E-3	1.1E-2	8.1E-4
Background (b)	1.6E-2				

9 2 1 2 1 5 2 0 3 3 0

Table E-5. Grid Site Vegetation Results for 200 West Area for 1988 (pCi/g dry weight). (Sheet 3 of 3)

Location	Pu-239 ± Error
2W 2	a
2W 3	a
2W 4	a
2W 5	a
2W 6	a
2W 7	a
2W 8	5.6E-3 ± 1.0E-3
2W 9	a
2W10	a
2W12	a
2W13	8.0E-3 ± 1.6E-3
2W14	a
2W15	a
2W16	a
2W17	a
2W18	a
2W19	a
2W20	a
2W21	a
2W22	a
2W23	a
2W24	1.1E-2 ± 2.0E-3
2W25	a
2W26	a
2W27	a
2W28	a
2W29	a
2W30	a
2W31	a
2W32	a
2W33	7.7E-2 ± 9.4E-3
2W34	a
2W35	a
2WA	a
2WB	7.8E-3 ± 1.4E-3
2WC	a
2WD	a
2WE	a
2WF	a
Maximum	7.7E-2
Minimum	5.6E-3
Mean	2.2E-2
Background (b)	3.5E-4

NOTE: Negative values indicate concentrations at or near background levels of radioactivity.
(a) Not analyzed for this radionuclide.
(b) Derived from PNL 1988 data (PNL 1989). Background numbers represent mean + 2 SE.

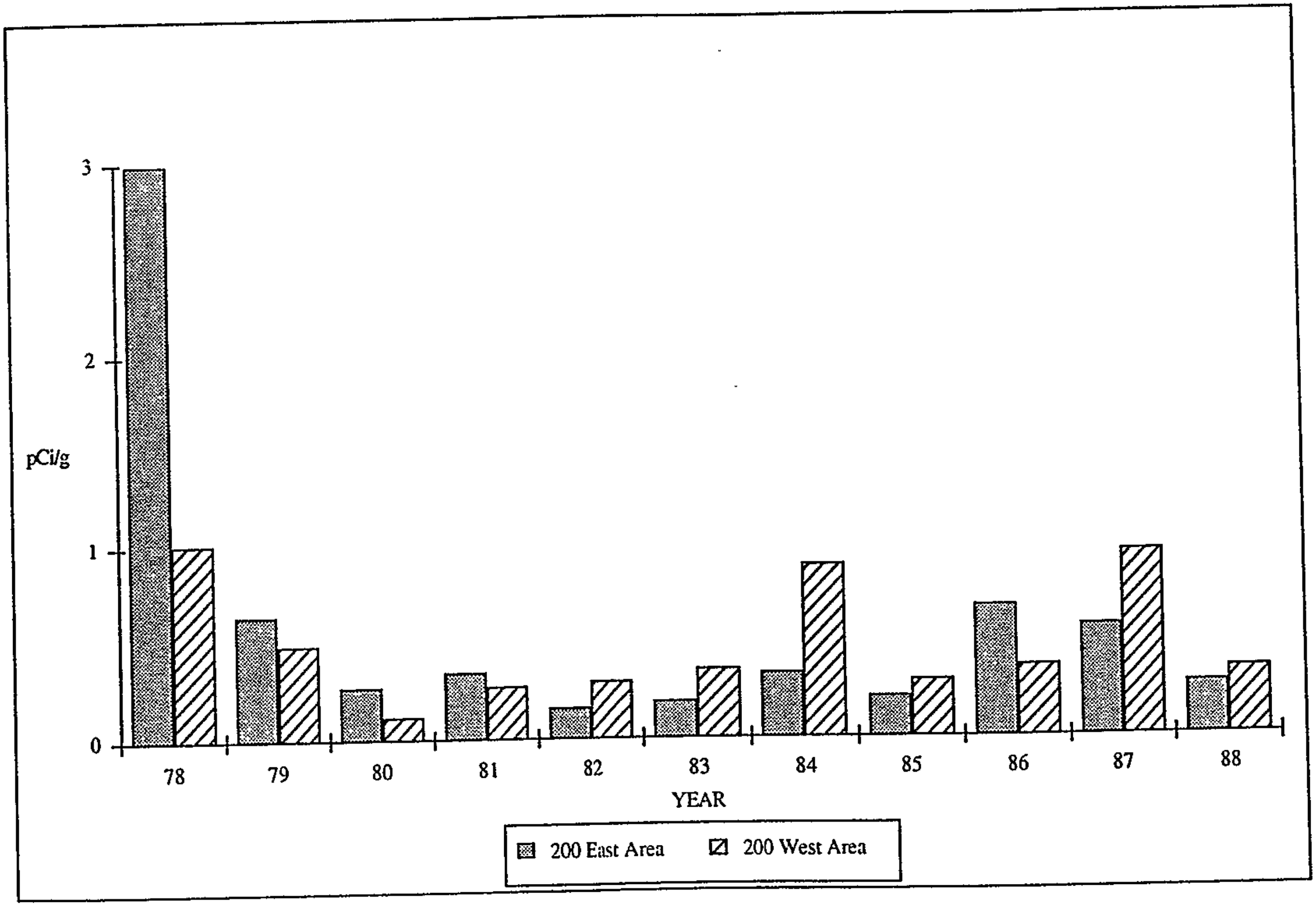

Figure E-10. Yearly Averages for Cesium-137 in Vegetation.

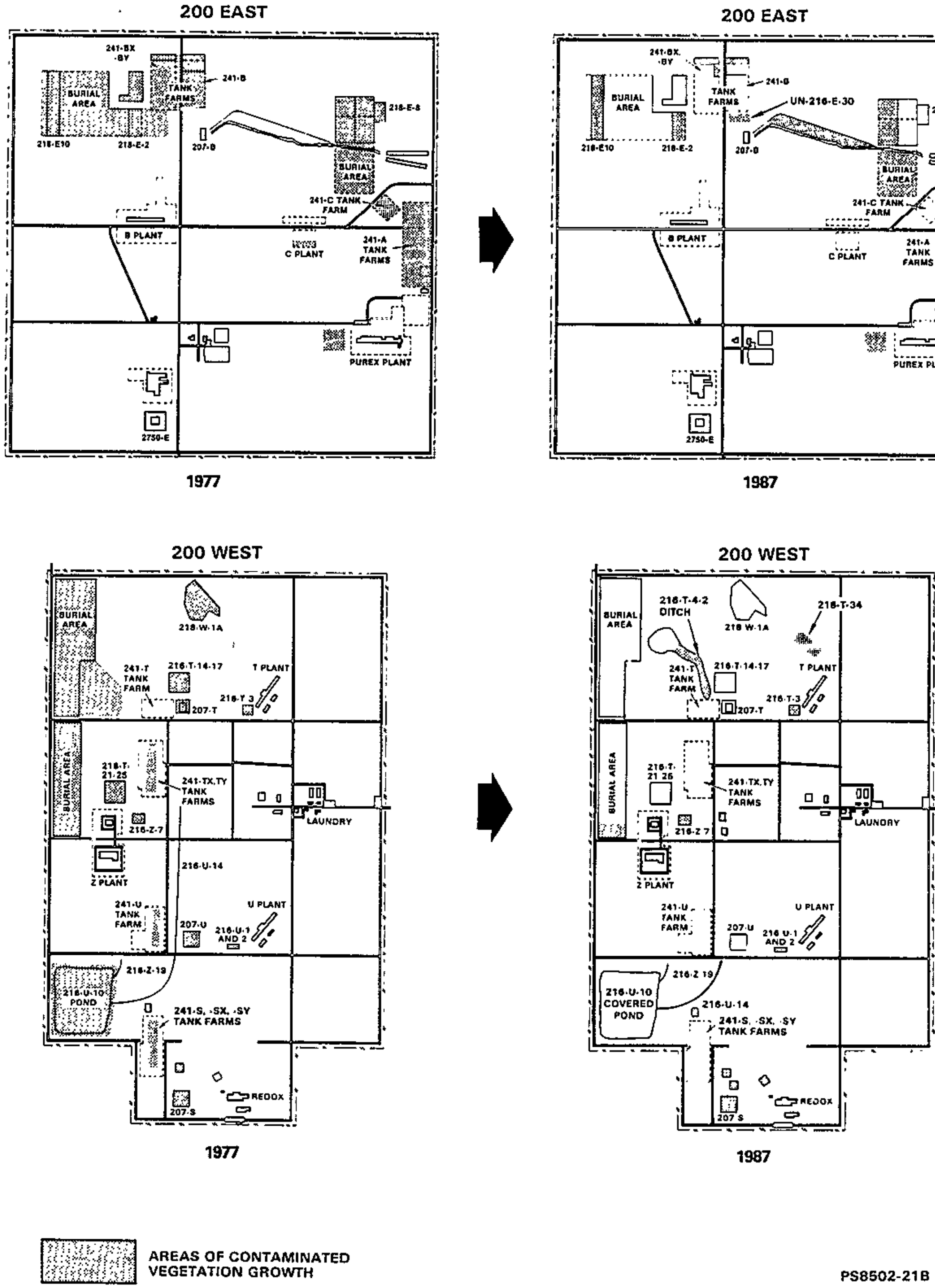

Figure E-11. Progress in Control of Contaminated Vegetation inside of the 200 Areas.

9 2 1 2 1 5 2 0 3 3 3

Table E-6. Location of Soil Samples Taken for Herbicide Residue.

Well	Location
299-E17-01	End of 216-A-10 Crib
299-E17-05	Near 216-A-36B Crib
299-E17-13	Near 216-A-45 Crib
299-E25-06	216-A-8 Crib
299-E25-11	Near 216-A-30 Crib
299-E25-19	Near 216-A-37-1 Crib
299-E28-13	Near 216-B-55 Crib
299-E28-18	216-B-62 Crib
299-E33-18	Near B Tank Farm
299-W18-20	Next to Z-20 Crib
299-W19-01	Next to U-14 Ditch
299-W19-02	Next to 216-U-8 Crib
299-W19-17	Inside U-1-2 Crib Zone
299-W19-18	Next to 16th Ave.
299-W19-25	Next to U-17 Crib
299-W23-04	Next to 216-S-21 Crib
299-W23-09	216-S-25 Crib
299-W27-01	216-S-26 Crib
699-35-78A	Across from U Pond
699-53-47 A/B	Gable Mt Pond

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APPENDIX F

EXTERNAL RADIATION MONITORING FIGURES AND TABLES

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Table F-1. The 1988 Thermoluminescent Dosimeter Results from 200 East Area.

Map location	Site	Dose rate (mrem/yr)		
		Yearly maximum (a)	Yearly minimum (a)	Measured total (b)
2E 1	200 East Area NW	112	85	96
2E 2	241-BY Tank Farm NW	135	103	113
2E 3	241-B,-BY Tank Farm N	180	139	155
2E 4	241-B,-BY Tank Farm NE	142	96	120
2E 5	E-12B N	123	98	110
2E 6	200 East Area NE	119	92	103
2E 7	E-10 W	129	92	107
2E 8	E-10 E	120	91	105
2E 9	241-BX Tank Farm S	162	121	139
2E10	B-63 N	156	127	144
2E11	E-12B N	134	107	117
2E12	E-12B E	119	93	105
2E13	200 East Area W	104	84	97
2E14	B-Plant W	109	87	101
2E15	B-Plant NE	121	99	112
2E16	221-C Excavation NW	114	93	107
2E17	241-C Tank Farm W	134	108	124
2E18	241-C Tank Farm E	139	117	125
2E19	200 East Area W	108	87	97
2E20	B-Plant SSW	106	60	88
2E21	B-Plant SSE	110	66	91
2E22	Semiworks SSE	113	70	98
2E23	PUREX N	138	65	115
2E24	PUREX NE	148	70	114
2E25	200 East Area W	109	65	90
2E26	2101-M W	116	66	95
2E27	2101-M E	109	65	87
2E28	284-E Powerhouse SE	113	72	91
2E29	PUREX S	104	64	89
2E30	PUREX SE	114	65	92
2E31	U.S. Ecology N	107	61	86
2E32	B-C Cribs NW	111	61	93
2E33	200 East Area S	107	61	90
2E34	200 East Area S	119	64	95
2E35	200 East Area S	111	59	89
2E36	200 East Area SW	109	62	89
2EA	200 East Area SW	105	58	85
2EB	200 East Area SW	106	62	90
2EC	200 East Area SW	109	66	93
2ED	216-A-29 Ditch E	122	72	103
Grout NE N991	NE of TGF (N991)	107	86	94
Grout SE N992	SE of TGF (N992)	114	85	100
Grout SW N993	SW of TGF (N993)	123	79	99

NOTE: The 1988 background ranged from 83 to 93 mrem/yr (PNL 1989).
(a) Quarterly dose rates normalized to annual dose rate equivalent.
(b) The mean value for the measured totals is 103 ± 16.

Table F-2. The 1988 Thermoluminescent Dosimeter Results from 200 West Area.

Map location	Site	Dose rate (mrem/yr)		
		Yearly maximum (a)	Yearly minimum (a)	Measured total (b)
2W 2	216-T-4 Pond N	156	123	133
2W 3	W-1A N	118	90	101
2W 4	T-Plant N	114	92	99
2W 5	200 West Area NE	105	93	99
2W 6	200 West Area W	115	82	94
2W 7	W-2A E	136	94	110
2W 8	241-T Tank Farm E	215	172	190
2W 9	Near 291-T-1 Stack	123	97	109
2W10	200 West Area NE	115	92	100
2W12	W-1 E	125	89	101
2W13	241-TX Tank Farm E	196	125	150
2W14	284-W Powerhouse N	101	86	92
2W15	200 West Area E	111	90	100
2W16	200 West Area W	110	86	98
2W17	Z-Plant W	117	95	106
2W18	216-U-14 Ditch W	104	88	94
2W19	284-W Powerhouse S	109	85	96
2W20	200 West Area E	124	93	105
2W21	200 West Area W	110	85	96
2W22	Z-Plant S	124	93	105
2W23	241-U Tank Farm E	249	208	220
2W24	U-Plant SE	111	93	103
2W25	200 West Area E	117	87	96
2W26	200 West Area W	113	89	100
2W27	SE U-10 Covered Pond	124	101	109
2W28	241-SX Tank Farm E	134	102	111
2W29	U-Plant S	123	94	104
2W30	200 West Area SE	114	90	98
2W31	200 West Area SW	108	83	94
2W32	200 West Area S	114	90	98
2W33	207-S Retention Basin SE	125	86	103
2W34	Redox ESE	107	84	92
2W35	200 West Area SE	109	83	95

NOTE: The 1988 background ranged from 83 to 93 mrem/yr (PNL 1989).

(a) Quarterly dose rates normalized to annual dose rate equivalent.

(b) The mean value for the measured totals is 109 ± 27.

Table F-3. The 1988 Thermoluminescent Dosimeter Results from the Ponds and Ditches.

Map location	Site	Dose rate (mrem/yr)		
		Yearly maximum (a)	Yearly minimum (a)	Measured total
A-25P N	Gable Mt. Pond N	104	52	83
A-25P S	Gable Mt. Pond S	114	60	90
A-29D	216-A-29 Ditch	114	62	90
B-3D	216-B-3 Ditch	150	93	128
B-63D	216-B-63 Ditch	136	79	109
S-19P	216-S-19 Covered Pond	123	57	87
U-10P	216-U-10 Covered Pond N	193	61	112
U-14D	216-U-14 Covered Ditch	129	63	90
W Lake	West Lake	95	55	80
Z-19D	216-Z-19 Covered Ditch	110	67	87

NOTE: The 1988 background ranged from 83 to 93 mrem/yr (PNL 1989).
(a) Quarterly dose rates normalized to annual dose rate equivalent.

9 2 1 2 5 2 7 3 9 0

Table F-4. The 1988 Thermoluminescent Dosimeter Results from PUREX-Related Facilities.

Map location	Site	Dose rate (mrem/yr)		
		Yearly maximum (a)	Yearly minimum (a)	Measured total
202A# 1	PUREX #1	117	51	88
202A# 2	PUREX #2	110	52	88
202A# 3	PUREX #3	105	70	90
A10 # 1	216-A-10 Crib #1	110	59	88
A10 # 2	216-A-10 Crib #2	107	51	84
A30 # 1	216-A-30 Crib #1	105	68	92
A30 # 2	216-A-30 Crib #2	105	63	89
A36B# 1	216-A-36B Crib #1	110	56	88
A36B# 2	216-A-36B Crib #2	104	54	83
A37-1# 1	216-A-37-1 Crib #1	112	69	94
A37-1# 2	216-A-37-1 Crib #2	120	66	96
A8 # 1	216-A-8 Crib #1	117	73	103
A8 # 2	216-A-8 Crib #2	154	98	133
ATF # 1	241-A Tank Farm # 1	295	176	233
ATF # 2	241-A Tank Farm # 2	153	97	123
ATF # 3	241-A Tank Farm # 3	151	96	129
ATF # 4	241-A Tank Farm # 4	140	86	119
ATF # 5	241-A Tank Farm # 5	119	80	101
ATF # 6	241-A Tank Farm # 6	126	77	106
ATF # 7	241-A Tank Farm # 7	149	110	132
ATF # 8	241-A Tank Farm # 8	2,778	1,316	2,212
ATF # 9	241-A Tank Farm # 9	864	464	616
ATF #10	241-A Tank Farm #10	1,075	453	742
ATF #11	241-A Tank Farm #11	150	104	122
ATF #12	241-A Tank Farm #12	146	112	129
ATF #13	241-A Tank Farm #13	131	108	120
B55 # 1	216-B-55 Crib #1	117	79	101
B55 # 2	216-B-55 Crib #2	103	66	88
B62 # 1	216-B-62 Crib #1	97	66	86
B62 # 2	216-B-62 Crib #2	104	59	85
U12 # 1	216-U-12 Crib #1	110	55	89
U12 # 2	216-U-12 Crib #2	128	89	113

NOTE: The 1988 background ranged from 83 to 93 mrem/yr (PNL 1989).
(a) Quarterly dose rates normalized to annual dose rate equivalent.

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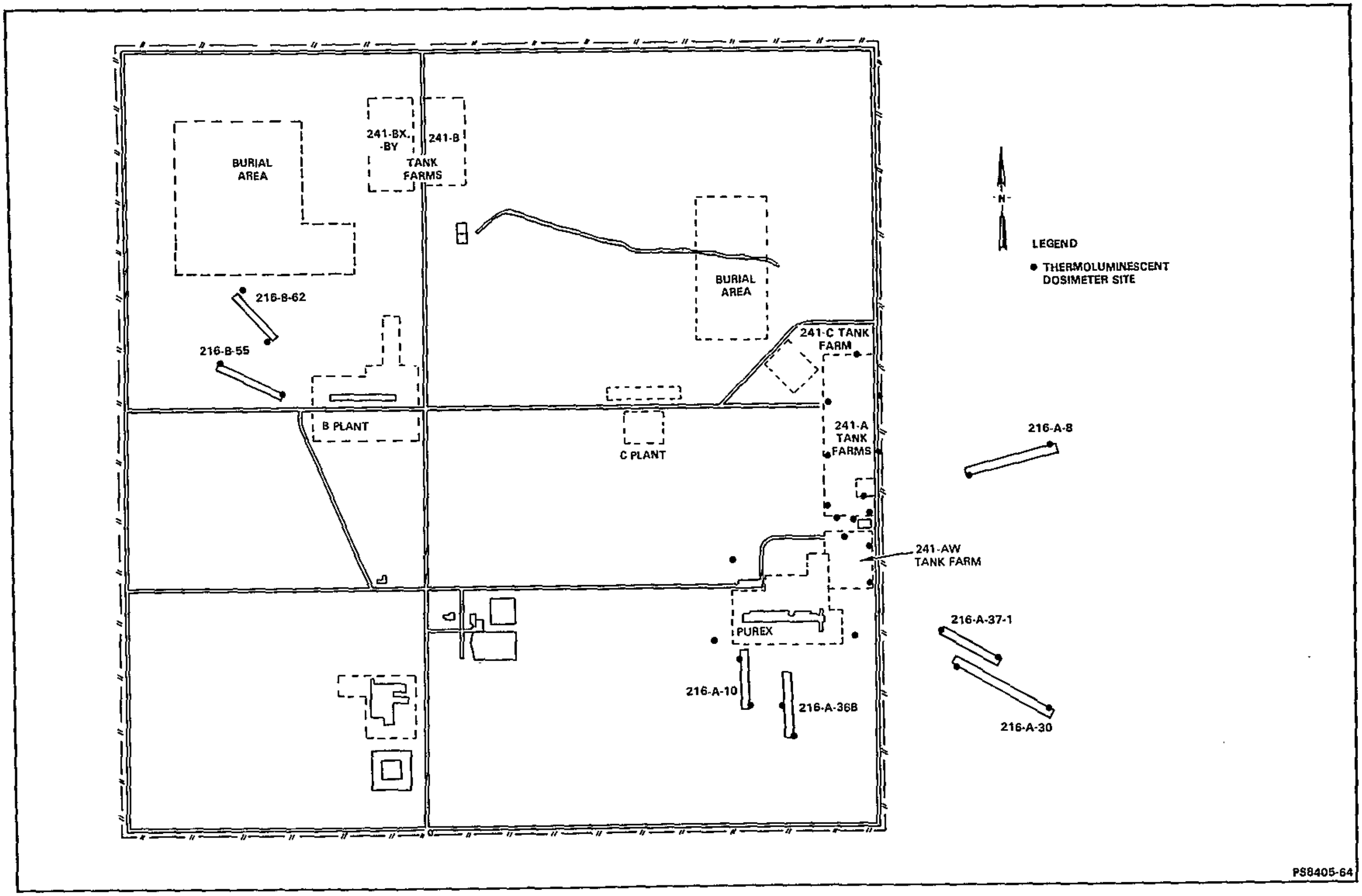

Figure F-1. The PUREX Plant-Related Thermoluminescent Dosimeter Locations.

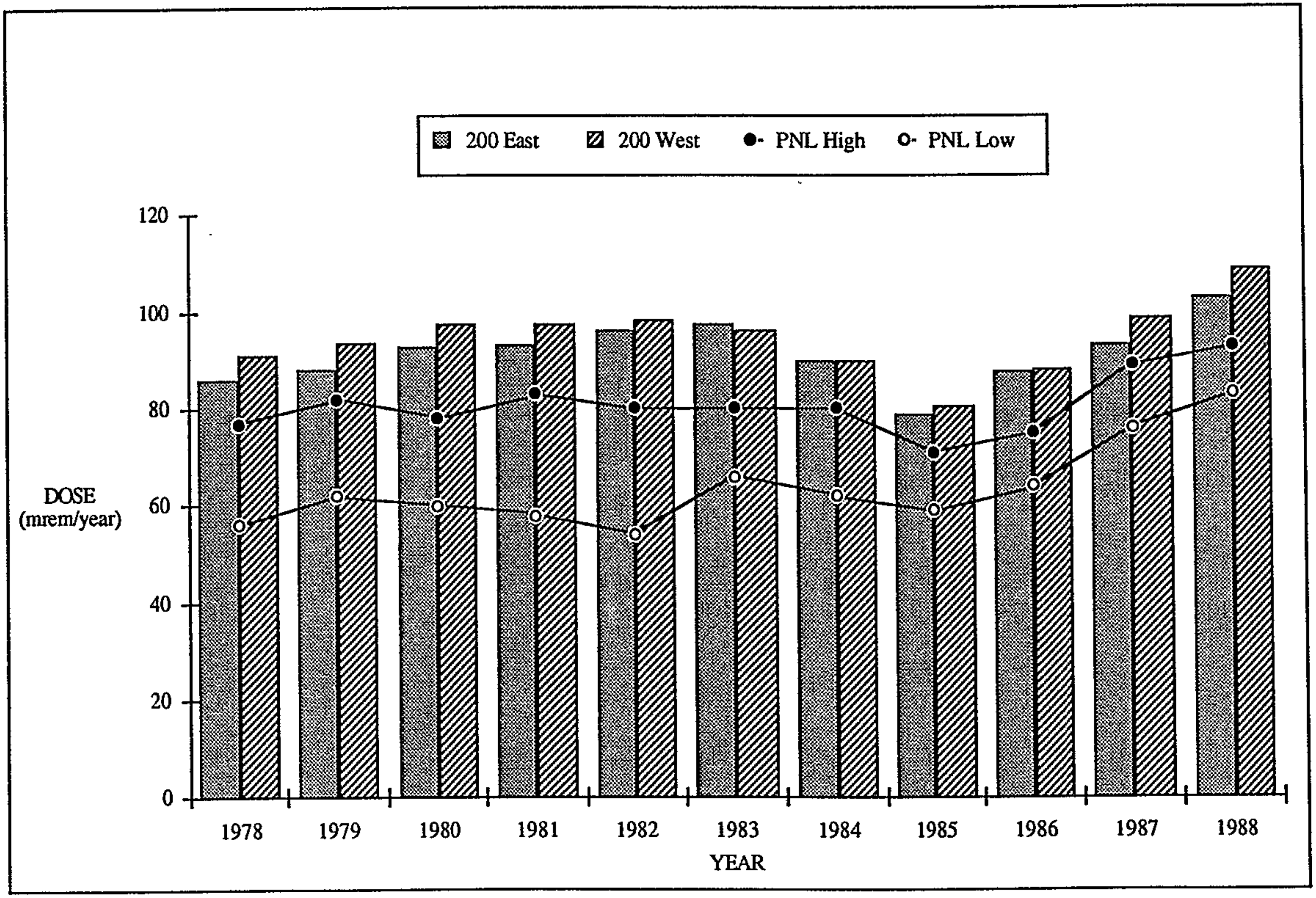

Figure F-2. Yearly Averages for Thermoluminescent Dosimeter versus Pacific Northwest Laboratories Perimeter Stations.

APPENDIX G

POND AND DITCH MONITORING FIGURES AND TABLES

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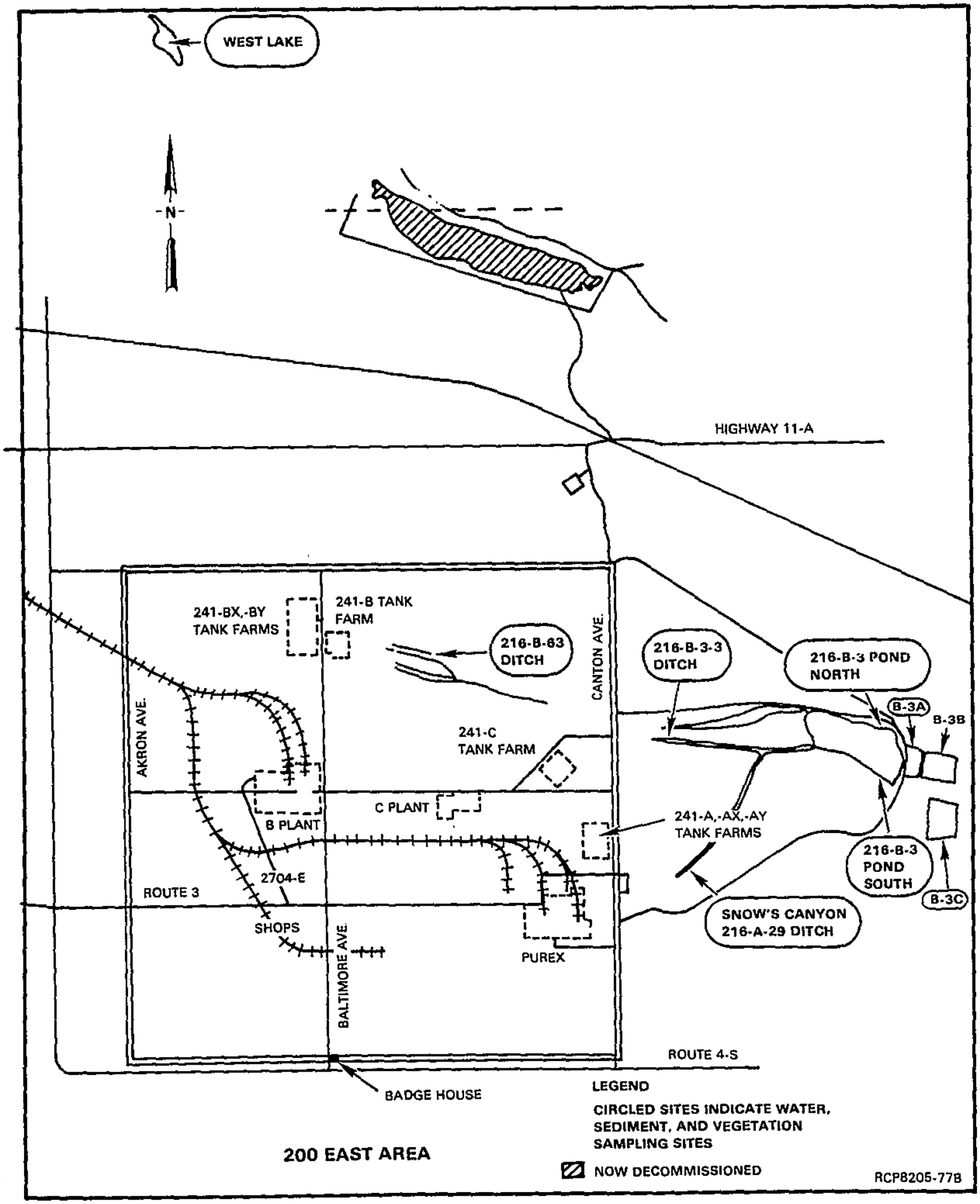

Figure G-1. The 200 East Area Pond and Ditch Sample Sites.

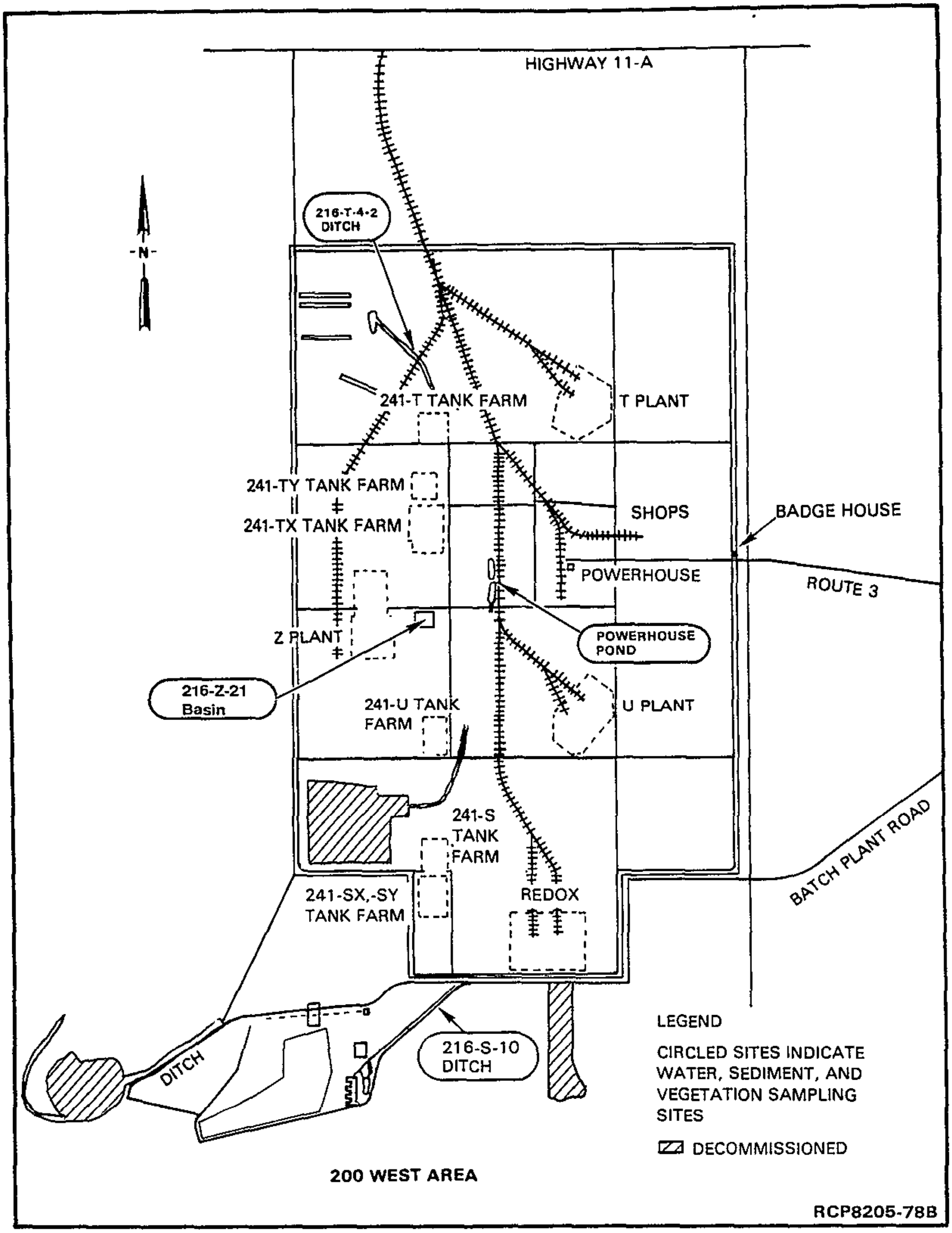

Figure G-2. The 200 West Area Pond and Ditch Sample Sites.

Table G-1. The 200 Areas and Ditches and Their Water Sources.

Pond or ditch	Location	Source
216-B-3 (B Pond)	Figure G-1	B Plant cooling water (216-B-2 Ditch) PUREX Plant chemical sewer (216-A-29 Ditch) 200-E powerhouse (pipe)
216-B-3-3 Ditch to B Pond	Figure G-1	Cooling water from PUREX and B Plants, 242-A Evaporator, and 241-A-701
216-B-63 Ditch	Figure G-1	B Plant chemical sewer (pipe)
216-T-4-2 Ditch	Figure G-2	221-T and 224-T waste water (ditch)
216-N-8 Pond (West Lake)	Figure G-1	Groundwater seepage basin (does not receive liquid discharges)
216-A-29 Ditch	Figure G-1	PUREX plant chemical sewer
Powerhouse Pond	Figure G-2	200-W powerhouse (nonradioactive but treated as potentially radioactive)
216-S-10 Ditch	Figure G-2	202-S bearing cooling water
216-Z-21 Basin	Figure G-2	De-mister and cooling water from Z-Plant

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Table G-2. Surface Water Results for 1988 (pCi/L).

Site number	Sampling site	Total beta		Total alpha		Cs-137		Sr-90	
		Maximum	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum
RM 3	216-T-4-2 Ditch	276	<DL	<DL	<DL	<250	<DL	<DL	<DL
RM18	216-B-63 Ditch	<DL	<DL	29	<DL	149	<DL	<DL	<DL
RM20	216-A-29 Ditch	<DL	<DL	5	<DL	<DL	<DL	<DL	<DL
RM21	216-B-3-3 Ditch	191	<DL	<DL	<DL	<DL	<DL	<DL	14
RM22	216-B-3 Pond N	115	<DL	<DL	<DL	<DL	<DL	<DL	<DL
RM23	216-B-3 Pond S	112	<DL	5	<DL	125	<DL	<DL	<DL
RM26	216-B-3 Pond overflow	102	<DL	<DL	<DL	<DL	<DL	<DL	<DL
RM27	Powerhouse Pond	23	<DL	<DL	<DL	<DL	<DL	<DL	<DL
RM28	216-S-10 Ditch	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
RM29	216-B-3 Pond 3rd overflow	100	<DL	5	<DL	87	<DL	27	<DL
RM30	216-Z-21 Basin	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
RM53	Westlake	642	18	114	3	<DL	0	<DL	<DL
	Detection limit	100		40		200		100	
	Derived concentration guideline	1,000 (a)		30 (b)		3,000		1,000	

NOTE: <DL = less than detection limit.
(a) Using Sr-90 DCG for comparison.
(b) Using Pu-239 DCG for comparison.

9 2 1 2 5 2 7 3 9 9

Table G-3. Nonradiological Parameters in Water at the Ponds and Ditches for 1988.

Site number	Sampling site	pH			Nitrate (NO3) (ppm).		
		Maximum	Minimum	Average	Maximum	Minimum	Average
RM 3	216-T-4-2 Ditch	8.0	6.1	7.5	<DL	<DL	<DL
RM18	216-B-63 Ditch	8.4	6.9	7.8	<DL	<DL	<DL
RM20	216-A-29 Ditch	8.6	6.9	7.8	<DL	<DL	<DL
RM21	216-B-3-3 Ditch	9.0	7.4	8.2	<DL	<DL	<DL
RM22	216-B-3 Pond N	9.6	7.3	8.4	<DL	<DL	<DL
RM23	216-B-3 Pond S	9.7	6.9	8.5	<DL	<DL	<DL
RM26	216-B-3 Pond overflow	9.7	7.1	8.5	<DL	<DL	<DL
RM27	Powerhouse Pond	10.4	6.9	9.4	<DL	<DL	<DL
RM28	216-S-10 Ditch	9.6	7.0	7.8	<DL	<DL	<DL
RM29	216-B-3 Pond 3rd overflow	9.8	7.2	8.4	<DL	<DL	<DL
RM30	216-Z-21 Basin	9.0	7.2	8.1	<DL	<DL	<DL
RM53	Westlake	10.0	7.7	9.5	<DL	<DL	<DL

NOTE: pH maximum and minimum are from weekly samples.
<DL = less than detection limit (~1.2 ppm).

Table G-4. Radionuclide Concentrations in Aquatic Vegetation Samples from Separations Area Ponds and Ditches for 1988.

Sample Site	Sr-90 (pCi/g)	Ru-106 (pCi/g)	Sb-125 (pCi/g)	Cs-134 (pCi/g)	Cs-137 (pCi/g)	Ce-144 (pCi/g)	Tl-208 (pCi/g)	Pb-212 (pCi/g)	Bi-214 (pCi/g)	Pb-214 (pCi/g)	Pu-239 (pCi/g)	U (g/g)
216-A-29 Ditch	0.5	280	19	0.9	36.0	a	0.2	0.93	1.8	2.0	8.3	1.3E-6
216-B-3 Pond 1st Overflow	<0.4	a	a	a	221	a	a	a	3.9	4.6	<1	7.8E-7
216-B-3 Pond 3rd Overflow	0.9	a	a	a	6.1	a	a	0.69	3.6	3.9	<1	2.2E-7
216-B-3 Pond N	0.4	6.8	a	a	46.8	22.9	a	a	3.9	4.7	5.9	1.4E-6
216-B-3 Pond S	0.4	a	a	a	11.4	a	a	0.63	a	1.9	<1	6.5E-7
216-B-3-3 Ditch	12.8	a	a	a	7.3	a	a	a	a	1.9	<1	4.7E-8
216-B-63 Ditch	2.5	a	a	a	26.2	a	a	a	a	1.4	<1	5.8E-8
216-S-10 Ditch	<0.6	a	a	a	8.1	a	a	a	3.2	3.1	<1	3.0E-8
216-T-4 Ditch	4.2	a	a	a	38.3	a	a	a	a	2.7	<1	9.5E-8
Westlake	<0.4	a	a	a	1.3	a	a	a	1.1	1.2	<1	3.6E-7

Note: No standard deviation is available
(a) Not routinely reported.

Table G-5. Radionuclide Concentrations in Sediment Samples from Separations Area Ponds and Ditches for 1988.

Sample Site	Co-60 (pCi/g)	Sr-90 (pCi/g)	Ru-106 (pCi/g)	Sb-125 (pCi/g)	Cs-134 (pCi/g)	Cs-137 (pCi/g)	Ce-144 (pCi/g)	Tl-208 (pCi/g)	Pb-212 (pCi/g)	Bi-214 (pCi/g)	Pb-214 (pCi/g)	Ra-226 (pCi/g)	Pu-239 (pCi/g)	U (g/g)
216-A-29 Ditch	a	0.7	127	9.4	0.7	23.5	3.8	0.25	0.91	a	1.0	a	2.2	7.9E-7
216-B-3 Pond S	a	<0.9	a	a	a	5.7	a	0.15	0.61	0.4	0.6	a	<1	4.1E-7
216-B-3-3 Ditch	a	1.9	a	a	a	108	a	0.20	0.76	0.7	a	a	<1	1.1E-6
216-B-63 Ditch	a	129	a	a	a	255	a	a	0.74	1.1	a	11.6	<1	1.4E-6
216-S-10 Ditch	a	<0.4	a	a	a	6.1	a	0.25	0.68	a	0.8	2.2	3.5	8.7E-7
216-T-4 Ditch	7.6	<1.2	a	a	a	2550	a	a	a	a	a	66.6	<1	1.1E-5
Westlake	a	0.6	a	a	a	0.4	a	a	a	a	a	a	<1	1.4E-6
200 Area Soil Statdards	5,000	600	15	60,000	10,000	20,000	1,900					60	75	

Note: No standard deviation is available
(a) Not routinely reported.

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APPENDIX H

RADIOLOGICAL SURVEYS FIGURES AND TABLES

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Table H-1. The 1988 Radiological Survey Schedule.

Interval	Areas scheduled for surveys
Bimonthly	Surveys of all paved and improved road surfaces inside 200 Areas
Quarterly	200 Areas outside perimeter roads Route 3 and 4-S from 200 West to 200 East hill 216-B-55 and -62 Cribs 216-T-30 Catch Tank between the 222-T and 221-T Buildings 216-A-8, -10, -30, -36b, -45, -37-1, and -37-2 Cribs 216-U-12 and -17 Cribs 216-U-16, -S-25, -S-26, and -Z-20 Cribs 216-W-LWC Cross-country transfer line 618-10 and -11 Burial Grounds
Semiannually	216-B-2-1, -2-2, and -2-3 Ditches (backfilled) All stabilized sites in the 200 and 600 Areas BC cribs and ground plots BC cribs controlled area roads and fire breaks Vent station on east/west cross-country transfer line 216-N Wastes Sites UN-216-W-5, -23, and -33 216-S-10 Ditch
Annually	Roofs of 202-S, 222-S, 276-S, 221-U, 231-Z, 221-T, and 200 East powerhouse Burial grounds in the 600 Area not surveyed semiannually Nonstabilized burial grounds in the 200 Area Underground pipeline to B-3-3 Ditch from the B-2-3 Ditch Outdoor areas at PUREX Plant, 244-AR Vault, B Plant, and Hot Semiworks All tank farm perimeters West Lake, 216-B-3 and 216-T-4 Pond All ditch banks, backfilled ditches, cribs, trenches, drains, and inactive burial grounds not covered quarterly or semiannually Outdoor areas of Laundry, REDOX, and 222-S, -U, -T, and -Z Plants All unplanned release sites not surveyed semiannually Retention basins inside the 200 Areas

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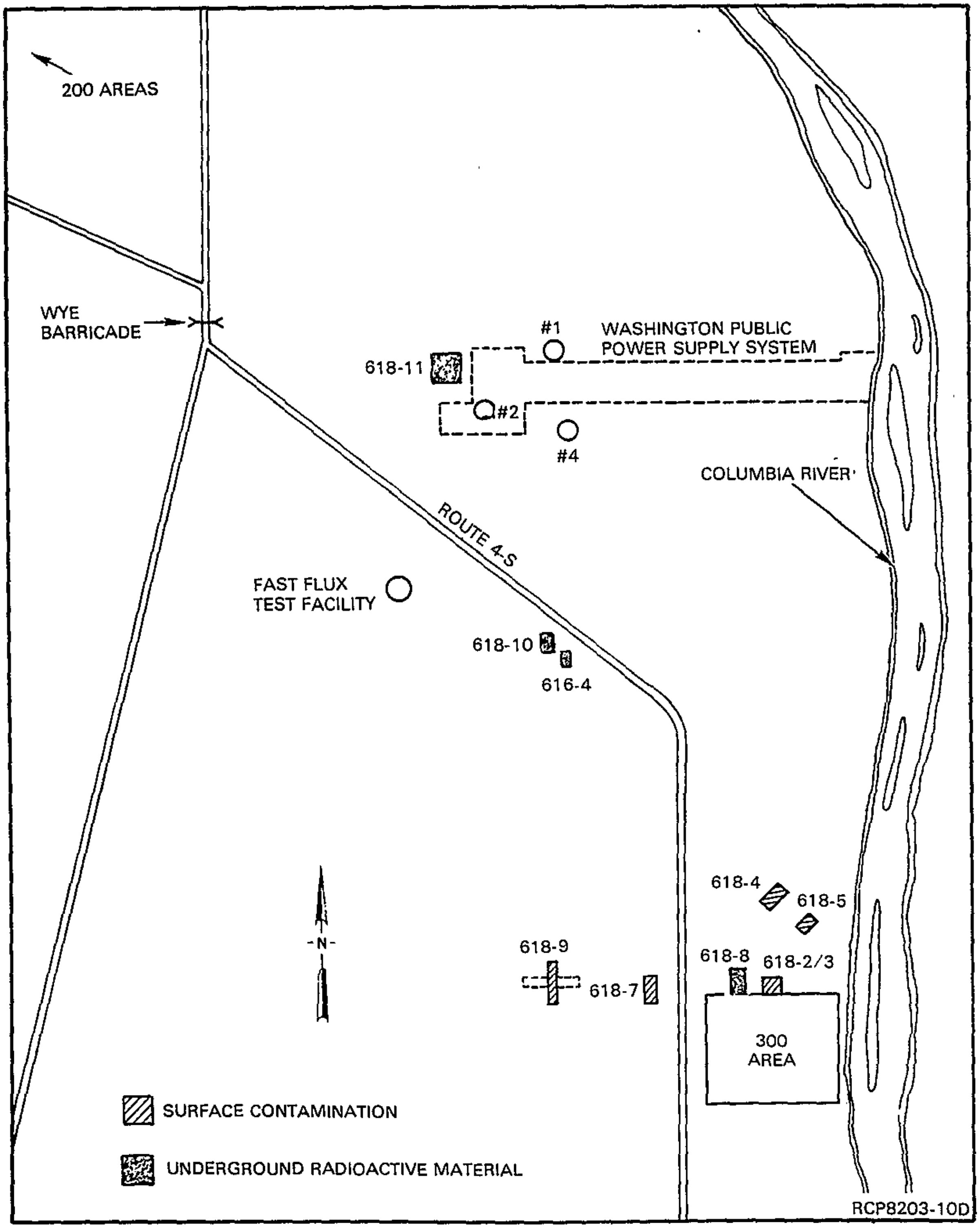

Figure H-1. The 600 Area Burial Grounds.

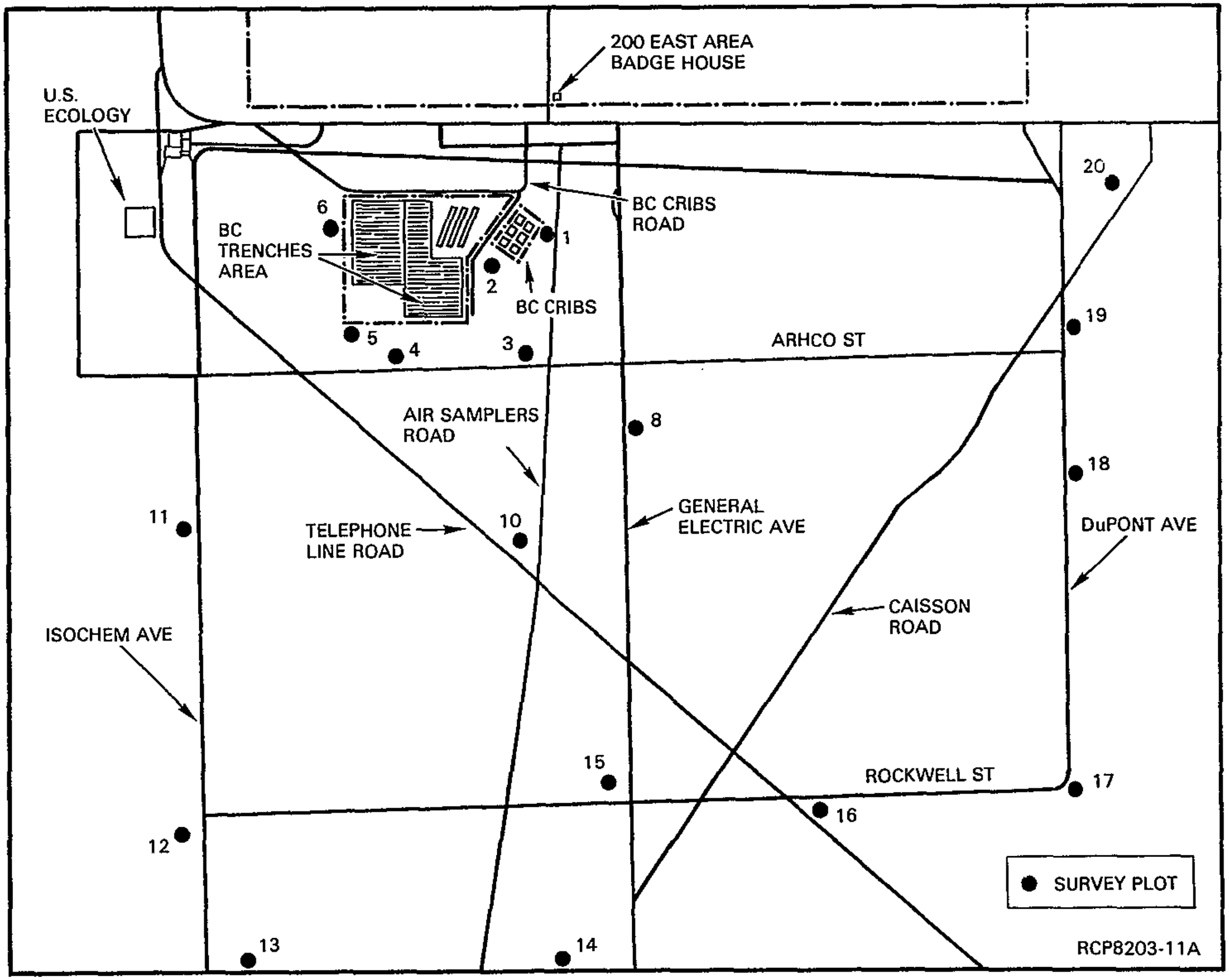

Figure H-2. The BC Cribs Controlled Area.

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APPENDIX I

CONCENTRATION GUIDELINES

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Table I-1. Airborne Derived Concentration Guidelines (DCGs).

Radionuclide	DCG (pCi/m3)
Sr-90	9
Cs-137	400
Ru-106	30
Pu-239	0.02

Table I-2. Groundwater ACVs versus DCGs for Water (pCi/L).

Radionuclide	200 East	200 West	600 Area	DCG
H-3	None	None	None	2,000,000
Co-60	5,000	5,000	5,000	5,000
Sr-90	74	480	40	1,000
Tc-99	4,000	4,000	4,000	100,000
Ru-106	6,000	6,000	240	6,000
I-129	20	20	20	500
Cs-137	210	1,200	120	3,000
U-234	20	20	20	500
U-235, 238	24	24	24	600
Pu-238	2.0	3.6	1.6	40
Pu-239, 240	1.2	1.2	1.2	30

Table I-3. Surface Soil Concentration Guides.

Radionuclide	Guide (pCi/g)
Co-58	10,000
Co-60	5,000
Sr-90	600
I-129	4,000
Cs-134	10,000
Cs-137	20,000
Ce-144	1,900
Eu-152	3,000
Eu-154	3,000
Eu-155	20,000
Pu-238	75
Pu-239	75

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